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The strategy used to construct the Field Instrument for Evaluation of Learning Devices (FIELD) is described. FIELD is a data collection instrument which can produce useful information concerning the cost, utilization, pattern, and overall effectiveness of presently operating or proposed multi-media systems in higher education. Part I is an expository presentation based on 4 major objectives: establishing a working definition of a multi-media system; identifying basic planning steps that may lead to the use of multi-media to solve specific instructional situations at individual institutions; determining what general types of teaching activities can be handled best by particular systems; and determining objective criteria to evaluate the usefulness of multi-media systems in higher education. Part II is a detailed documentation of activities conducted in the Washington Office of American Institutes for Research, and in 4 universities where multi-media systems were evaluated. Also included are the findings of the FIELD tryout and specifications for an improved evaluation device, NEW FIELD, which would permit examination of a smaller number of variables than FIELD. There are 16 charts; 2 appendices contain the questionnaires developed and used during the study. (WM)

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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SUMMARY

The educational decision maker has the responsibility for planning for the mediated instructional systems within his institution. This planning ultimately results in a decision concerning: (A) Whether proposed media systems are justified in terms of potential benefits for the investment required, and (B) the degree to which presently operating media systems should receive continued funding and support.

To make these decisions in a systematic and objective manner, he must have either access to or a means for obtaining evaluative information and for relating this to the goal he wishes to achieve.

The purpose of this research was the development of a strategy for media evaluation and selection.

The following objectives were accomplished:

- Definition of media systems as a part of instructional technology.
- Specification of an overall planning strategy for the media evaluation and selection.
- Design of a strategy for identifying the characteristics of a teaching task and specifying the media which best serve those characteristics.
- Development of the specifications for an instrument (NEW FIELD) which can be used for the evaluation of present or proposed media systems.

INTRODUCTION

A. Problem

To improve quality and to extend higher education to more students, institutions are investing increasingly in media and multi-media systems. At present few guides or procedures exist to assist the educator-administrator in planning or evaluating such systems and in this absence, costly errors may be made. Thus criteria are needed by which an educator-administrator may judge what class or category of system, equipment and materials are required in order to meet his defined educational goals.

B. Purpose

The purpose of this research was to empirically develop criteria and procedures to assist in deciding (1) to purchase multi-media systems and (2) what variety to purchase in order to meet present needs and long-term institutional goals. The original request for proposal from the U.S. Office of Education called for an analysis of the higher education process which results in the development of multi-media systems. Long-term, as well as the short range goals of the institution were to be considered. The criteria and procedures were to cover all classes of educational institutions, but be specific enough so that individual institutions might use them in analyzing their own situations. Those variables which influence the decisions regarding media evaluation and selection were to be considered. These include teaching objective, student population composition, faculty and technical staff requirements, facilities requirements, and cost effectiveness standards. Comparative analyses between conventional and multi-media systems as well as among alternative systems were envisaged.

C. Objectives

The following four major activities or objectives were identified early in the study:

1. Definition: Establish a working definition of a "multi-media system."
2. Basic Planning Steps: Identify and describe basic planning steps that may lead to the consideration of the use of multi-media as an alternative to solve specific instructional situations at individual institutions.
3. Media selection: Determine what general types of instructional activity (classroom, library, or laboratory) can best be handled by particular multi-media systems.
4. Evaluation: Determine what objective criteria can or should be established to evaluate the usefulness of multi-media systems in higher educational instructional situations. These criteria should be practical for the evaluation of the effectiveness of a multi-media system at the individual institution.

D. Arrangement of this report

Part I of this report contains expository matter arranged according to the four general objectives listed above.

- Part I, Sec. A, is entitled, "Definition of Multi-Media Instruction," and traces some of the reasoning which led to our classification of media systems.
- Part I, Sec. B, is entitled, "Basic Planning Steps," and describes a rationale in keeping with the second major objective.
- Part I, Sec. C, entitled, "Teaching/Learning Strategy Description," reports on the effort devoted to determination of means for matching media to specific instructional problems. This is in keeping with the third major objective.
- Part I, Sec. D explains the need and describes the means used to conduct the FIELD evaluation. It is entitled, "Evaluation of Multi-Media systems."

Part II of the report is devoted to the evaluation activities during the latter two-thirds of the project. It gives a detailed report and documentation of the activities at the American Institutes for Research, Washington Office, and in four universities where multi-media systems were evaluated. This section is divided into four parts. In Section A the "Methodology" is described; in Section B the "Findings" of the FIELD tryout are presented; in Section C these findings are discussed; and in Section D "Specifications" for an improved evaluation device (NEW FIELD) are presented.

I - HISTORICAL DEVELOPMENT

A. Definition of Multi-Media Instruction

1. Multi-media presentations. The classic example of a "multi-media presentation" takes place before a large group in an auditorium. A two-channel tape recorder is used to program and coordinate the sequence of events. One channel is an audio-commentary, recorded in advance and often including sound effects, music, etc. On the other channel are inaudible tone signals used to trigger room darkening and lightening, motion picture, slide and filmstrip projector and video tape activating at pre-determined moments, as well as programmed halts for instructor intervention. All this permits conventional lecturing, question periods, overhead projector presentations, etc.

The foregoing description serves as a narrow, functional definition for multi-media presentation. It is indeed the type of situation to which the term "multi-media" was first attached. However, over the years, this term has broadened.

In a recent publication, the Office of Education defined a new medium by listing the types of electro-mechanical devices used to transmit educational information. The list included teaching machines, computer assisted instruction, educational radio, television, motion pictures, language laboratories, filmstrips, slides, graphics, audio and video recordings, and devices under development.

In Brown and Thornton's Higher Education Media Study (HEMS), "new media" were classified into approximately 30 categories and subcategories, one of which was "multi-media units." Without exception, the particular activities described under the HEMS Category "multi-media units" were physical plant facilities especially designed as loci for the type of presentation described in the first paragraph. Other categories described classes of apparatus which might be included in a physical plant facility devoted to "multi-media."

If "multi-media" is to refer to something more than a general meeting room with a variety of teaching apparatus installed, then an attempt must be made to write a useful definition which classifies this larger conceptualization. Many related terms, which frequently appear in the literature, impinge to one degree or another on our efforts to define the media. Some of these terms are listed below:

"New Media"
"Cross-Media"
"Multi-sensory"
"Two-Channel"
"The New Technology"
"Instructional Media Centers"

Some of the concepts buried among these terms are: the concept of newness, the idea of proven instructional validity or usefulness, the concept of mixing of instructional means, and the physical implementation of these means.

Obviously, "newness" is a relative matter. For example, 8mm film is an old technique (almost as old as radio), yet it is considered a relatively new medium in the audio-visual field, whereas radio frequently gets left out in considerations of educational media.

The term "media" is often coupled with the words "instructional" or "educational" and from this one could infer that the medium itself has some educational property. The problems of understanding the effect of mediation on the content of the message has been elaborately discussed by Marshall McLuhan. For example, it can be seen that the mediating technique used will undoubtedly have some kind of "reputation" or image as to its educational appropriateness.

In a study conducted by Samuel Becker at the University of Iowa, college students were found to be resistant to TV instruction, stating a preference for face-to-face instruction. This may have been a reflection of American youth's concept of television as frivolous while college instruction should be serious. Or it may have been an expression of a desire for two-way personal involvement.

2. The need for a definition. For a definition to be useful an agreement must be reached between the writer and the reader. It must attempt to provide a common understanding. Its value is in direct proportion to its explicitness and acceptability to both parties.

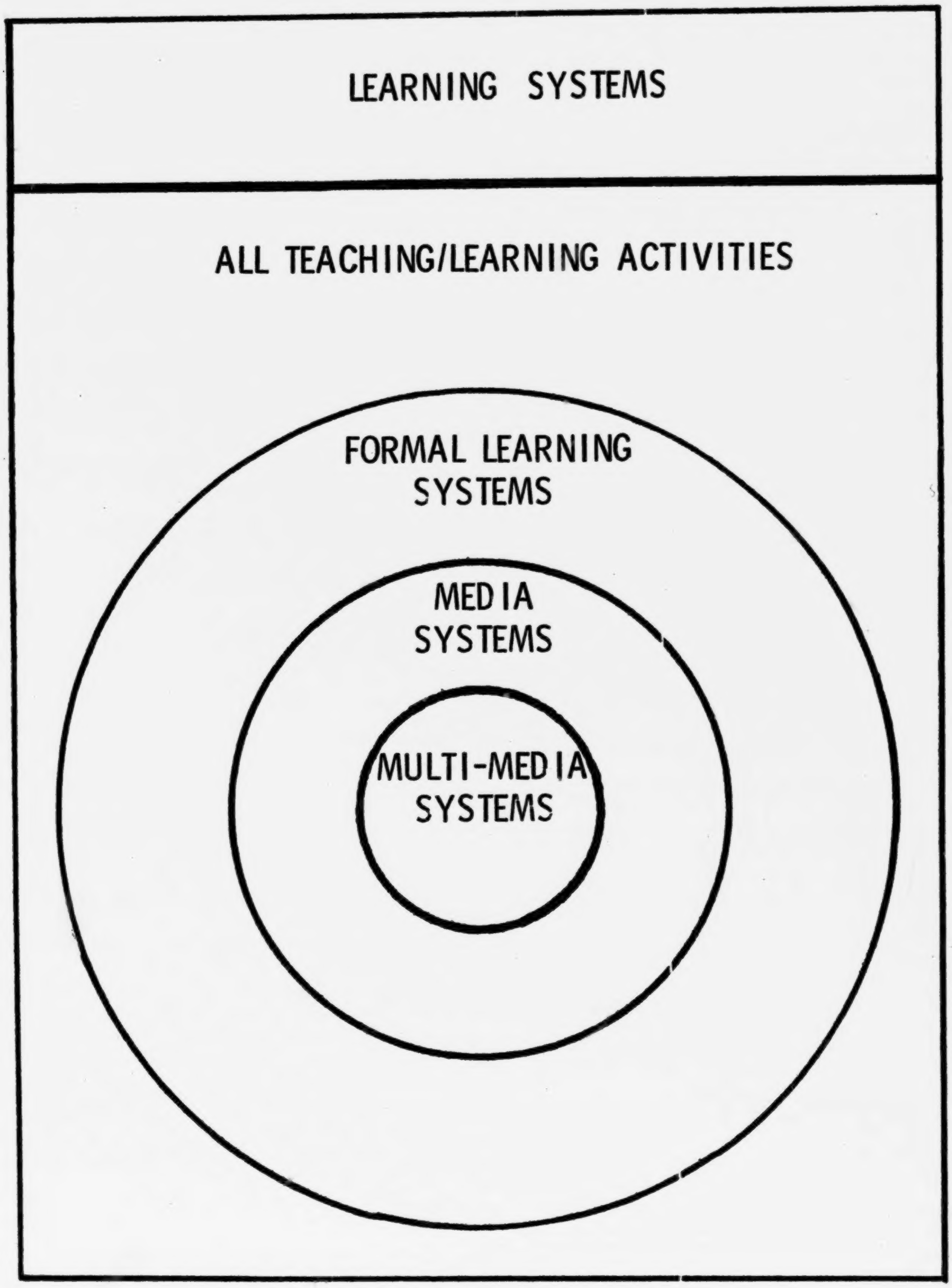
One approach would be to examine human learning activities and by a process of exclusion, narrow down the field until we have defined multi-media instructional systems. A chart on the following page indicates how this approach might work.

The class of "All Teaching/Learning Activities" includes everything from table manners to apprenticeship programs.

The class of "Formal Learning Systems" might help to zero in on schools and other programmatic efforts to convey information or change behavior.

The class "Media Systems" could include everything from the college humor magazine to an instructor's mimeographed handout entitled, "Reading Assignments."

CHART A - HUMAN LEARNING ACTIVITIES


LEARNING SYSTEMS
ALL TEACHING/LEARNING ACTIVITIES
FORMAL LEARNING SYSTEMS
MEDIA SYSTEMS
MULTI-MEDIA SYSTEMS

"Multi-Media Systems" might be defined as any intentional instructional activity involving two or more mediation elements or devices. But this won't help much because an instructor using chalk at a blackboard fits this definition. He is using air as the mediation element for his voice and the chalk and blackboard as a device for mediating pictorial symbology.

3. Definition based on attributes. A working definition might be based on the general attributes of multi-media systems. To examine whether a definition listing the attributes of a multi-media system would be workable, a "straw man" can be created, and then the fallacies of a definition listing attributes can be located.

a. The electro-mechanical attribute. Media systems usually involve some electrical, electronic, or mechanical apparatus used to enrich an educational presentation. The professor lecturing (audio) in front of a blackboard (visual) can be ruled out if the electro-mechanical attribute can be relied on to discriminate between systems. The professor has limited his equipment to a textbook, some notes and a piece of chalk. Of course, if a video picture of the same gentleman were transmitted over some distance to students in front of a "tube," an electro-mechanical device would be introduced and mediated instruction would be occurring.

The electro-mechanical criteria, if used, could rule out certain elements normally thought to be part of the new instructional technology. Programmed learning material is usually mediated through the programmed book format, and as such, it qualifies as a non-electro-mechanical form of "mono-media."

b. Storage and transmission attribute. A second attribute of multi-media instructional system is the capacity for storage, retrieval, and transmission of symbolic material which is in some way analogous to real-time human behavior. For example, a phonograph record constitutes a repository of stored verbal information. Sophisticated listeners can almost always identify the analog (played-back sound symbology). They rarely confuse it with real-time discourse.

Computer printouts, used in interactive computer-assisted-instruction to deliver learning sequences, consists of printed symbols which stand for or are analogous to speech utterances. The student receiving the stored information, which has been retrieved from the computer's memory and transmitted electro-mechanically to printout paper, receives through the medium of light transmission and the sensorium of his eyes a verbal communication which he must process mentally and react to as part of the learning activity.

Again, the receiver of the information is highly unlikely to confuse the computer print out information with real-time discourse. Films and television tapes provide for the storage, retrieval, transmission and replay of more complex interpersonal or natural events. Marshall McLuhan has provided convincing arguments concerning the energy level required of the beholders, arguing that high fidelity playback in any medium demands less of the beholder (in the way of synthesizing the experience) than low fidelity media which demand the active participation of the beholder in order to "build up" a meaningful synthesis of stimulus material and stored experience from his own repertoire.

The storage, retrieval and transmission criteria, though useful in a general way, fails to discriminate between systems which are multi-media instruction and those of a more conventional type. Textbooks and references certainly have storage and retrieval capabilities and one cannot overlook the professor as an agent for information storage, retrieval and dissemination. Similarly, group discussion (as an educational medium) depends upon multiple storage units and the retrieval and transmission involved in interaction among units. Yet it, too, does not fall within the framework of multi-media instruction.

It may be that the field of multi-media is helped toward definition by inclusion of the storage-retrieval-transmission attribute. All of the media tend toward linear or sequential delivery of information under the control of the author or editor of the original storage document. Even random access devices are under the control of a linearizing program when they are used for educational activities.

It is important to note that random access computers and display equipment (microfilm, etc.) can be used as educational tools if programmed in some meaningful sequence dependent upon the response activities of the learner. These same devices are also used for research where the same storage-retrieval and transmission activities occur without the intervention of a programmed control exerted by an editor.

c. Multi-sensory attribute. The classical multi-media presentation impinges on the human ear via the use of audio tape and upon the eyes via projection images observed on a screen or video tube in two dimensions. The captioned film for the deaf program involves the use of conventional sound films with supporting titles, sometimes projected by a separate projector kept in synchrony with the sound film projector. But we would not wish to rule out the "captioned films for the deaf" activity simply on the basis that it did not cross sensory boundaries.

Ruled out might be the use of transparencies, filmstrips, and slides on the basis that the perceptual channel being used was the visual channel. But, the vast majority of slide presentations, filmstrips and overhead transparency sets are accompanied by guidebooks, narration or other audio capabilities which augment the pictorial imagery. Still, an art teacher, lecturing from slides alone, might not qualify as a multi-media instructional system since the only electro-mechanical medium involved is the projection of visual images.

We might also examine the amplification of normal sensory abilities through the use of media systems. In this case we must find a way to discriminate between optical and television microscopy. Optical microscopy is old-fashioned, well accepted and of high fidelity. The other is new and classified as a media-based system. TV cameras frequently can provide magnifications far exceeding that of the human eye and zoom capabilities which are physically impossible for live observers.

d. Distance reduction attribute. In addition to the amplification of information intended for sensory absorption, multi-media systems frequently permit the extension of the senses geographically over long distances. The obvious examples are live, closed and open-circuit television, Dial Access retrieval systems, computer information storage and access, blackboard and radio. Here the medium makes it possible for the long-distance examination or study of a subject by students, often at an increase in fidelity or observational acuity.

e. Intimacy attribute. Multi-media instructional systems frequently make for a heightened sense of one-to-one instruction between instructor (or rather his reconstituted analogue) and the student. Video-tapes, language labs, audio-tutorials, self-instruction and programmed-instruction materials, and computers operating in an interactional mode can more often achieve a heightened sense of personal interchange, (even though the medium interferes with the actual warmth of direct personal contact) than could be obtained through conventional large-group classroom instruction.

f. Reality changing attribute. Media systems normally alter the reality they seek to reconstruct. That is, the delivered analogue is perceived as different or "less whole" than the real educational event one perceives through instruction.

Teachers of reading in center city schools insist that children must have experiences in the real world before they can "read" about experiences in textbooks. They make the point that children who have not had a trip to the farm or the zoo cannot attach meaning to the printed symbol "cow" or the pictorial representation of a zebra. Clearly, then, the reconstruction in the mind's eye of a mediated educational interaction requires a base of experience in order for the student to make any sense at all out of the transmitted analogue.

In a very real sense the act of reading, studying the illustrations, re-reading, and taking notes from the text is a partial reconstruction of a lecture and blackboard style of educational presentation. Authors of texts commonly prepare a text in a third-person, formal format.

Although the textbook is less than real in the sense that it is not alive, no voices can be heard or images be seen, it is also "more than real" in the sense that it can be read at an individual pace anywhere and anytime as many times as desired. That is, reality is lost by converting lectures to textbooks, but a new dimension of storage, retrieval and transmission as well as "instant replay" is added by the conversion of a lecture series to a textbook.

An example of the ability of media systems to alter reality may be seen in the use of time lapse photography to demonstrate heliotropic reactions in teaching botany.

4. Toward a pragmatic classification. How then can media systems be classified or organized into meaningful clusters or styles or mediation? How can 30 or more categories of educational media systems be coalesced into some meaningful arrangement?

In order to delimit our study and to identify the specific types of systems to be studied, we examined some of the salient features of the various media systems. On the following page is a chart entitled "Dichotomies which aid in Media Classification". These, and many other issues, were mulled over in the process of sorting media systems into groups.

CHART B - DICHOTOMIES WHICH AID IN MEDIA CLASSIFICATION

	Verbal Format	
PRINT	VS	AUDIO
The message is converted to printed characters, than "read" (rather than heard). (Programed Text)		The spoken message is recorded, stored, reconstituted and "heard" (Language Tapes)
	Location	
LOCAL	VS	DISTRIBUTED
Storage and retrieval are accomplished at or near the learning site. (Classroom Filmstrip)		Storage, retrieval and transmission are centralized. (CCTV applications)
	Availability	
DEMAND	VS	SCHEDULED
Instruction occurs as called for by student(s) or teacher. (DAIRS)		Instruction pre-planned; Students & teachers fit their plans to master schedule. (ETV)
	Intimacy	
REMOTE	VS	CLOSE-UP
Instruction has formal, stylized quality; "involvement" is low		Instruction has a personal, intimate or "real" quality
	Definition	
COOL	VS	HOT
Medium transmits only essential stimuli; students supply "fill in" from experience; demands attention. (Black board-by-wire)		Rich detail is provided; learner is passive observer, "feelings" rather than "intellect" reached.

Attempting then, to take various aspects and attributes of media into account, a system of categories which permit the clustering of media systems has been created. The arrangement of systems into classes has utility for planning evaluative measures.

The five classifications arrived at make possible the categorization of all the major types of media systems. They are also somewhat related to conditions of learning or teaching learning strategies. In addition, they lend themselves to categorizations according to instructional mode.

5. Classes of systems to be evaluated. The five general classifications of multi-media are identified below. Various attributes were used to separate systems into classes. Two classes were set up under a "verbal linear attribute" rubric because they are essentially verbal linear media; two have been identified by student activity qualities.

a. Verbal linear attribute. "Let us Reason Together." The two classes defined as verbal mediated have been arbitrarily entitled "Print-Structured" systems and "Audio-Linear" systems.

(1) Print-structured. Within the classification Print-structured are CAI (computer assisted instruction), PI (programmed instruction), and ERE (Edison Responsive Environment). Other mediation systems depending in large part on printed digital verbal stimulus presented sequentially according to planned, linear thought processes would fall into this group.

(2) Audio-linear. The Audio-linear cluster contains language laboratories, Dial Access Information, Retrieval

Systems and Tele-lecture apparatus. These and the more conventional audio teaching systems (like phonograph records and radio) are set aside as a class of systems based on the delivery of audible, iconic verbal information and stimulus materials in a planned sequential pattern.

b. Multi-media attribute. "Let me show you." Another media family, which consists of simultaneous audible and visible portions, has been separated into two clusters identified by distribution mode, distance, and storage location.

(1) Local. The "local multi-media family" includes multi-media classrooms, audio-tutorial tape/slide presentations, and local and library-based audio-visual systems in general. Where the teaching materials are located at or near the training site and used at the option of the student or instructor, then the media system will be considered to fit into the "local multi-media cluster."

(2) Distributed. The second cluster of the multi-media family systems is the electronically distribured media group. This includes CCTV (closed-circuit television), ETV (educational broadcast television), DAVid (Dial Access Video), and B-B-W (blackboard-by-wire). Other systems which permit delivery of both visual component and audio signal over large distances will fall in this class.

c. Activity mode. A final cluster or family of new educational techniques or systems is that group which can best be identified by its heightened levels of student activity. Examples of this class are: the self-confrontation uses of the VTR (video tape recorder), the "wrap-around" environments (like the classroom simulator and the driver trainer), the various games, interpersonal discussion experiences, and devices which have an open-ended (non-linear) activity as their reason for being. The important factor in these devices is the complex and open-ended form of behavior or activity on the part of the student. In most cases the student activity in this group of mediated instruction approaches more closely the final terminal behaviors sought by the instructor than do the artificial "test" behaviors associated with more "academic" objectives.

It should be pointed out, of course, that print-structured and audio-linear systems as well as the local multi-media and the distributed electronic media all permit one form or another of student activity. All too often student activity is limited to paper-and-pencil responses. Other systems may include push-button choices, tele-typewriter interactions, or tape-recorded utterances (as in the case of language systems). But each of the aforementioned response systems has a closed set of possible responses while the ACTIVE MODE systems permit a much larger repertoire of responses to be emitted.

6. Appropriate uses of media system classes. The above mentioned media system classes have been set down in a chart on the next page. Major members of each class are entered at the top of the chart. A listing of various instructional modes appears at the left-hand side of the chart.

Where instruction can effectively be carried out by the media system, an "X" has been entered opposite that instructional mode classification.

CHART C - APPROPRIATE USES OF MEDIA SYSTEMS

MEDIA SYSTEM	PRINT STRUCTURED			AUDIO-LINEAR			LOCAL MM		DISTRIBUTED MM				ACTIVE			
INSTRUCTION MODE	CAI	PI	ERE	LL	DAIRS	Telect.	MM	Aud/Tut	CCTV	ETV	DAVID	B-B-W	VTR	SIM	Game	Manipulatives&realia
CLASSROOM																
large		X		X	X	X	X		X	X		X				
medium		X		X	X	X	X		X	X		X				
small (seminar)		X		X	X		X		X				X	X	X	
FIELD TRIPS							X	X	X	X			X	X	X	
TESTING	X	X	X	X												
LIBRARY																
individual	X	X	X	X	X									X		X
retrieval	X				X						X					
LABORATORY																
lead-through		X						X							X	X
OTHER																
interpersonal													X	X		
counseling	X											X	X			

I - HISTORICAL DEVELOPMENT

B. Basic Planning Steps: A Model for Media System Planning.

1. Objective. The second objective of the program for evaluation of multi-media systems in higher education was the development of a planning paradigm for use by higher education institutions.

Planning of the type common in industrial and military establishments is rare in American colleges. Most new programs are developed on a "vest pocket basis." An aggressive, dynamic school or college administrator is selected and employed to "start-up" a new program, activity, college, etc. During the developmental stage, he works "out of his vest pocket" because he is never in his office; he is running too hard.

The essence of this method is that one man's dreams and ideas about the system under development constitute the plan. His authority and quick, expeditious decisions serve to bring the new activity to fruition.

In the following paragraphs a procedure is described for the more planful and orderly implementation of a multi-media system.

2. Planning Model. A general procedure is described here for the use of planners and decision-makers in the field of Higher Education. It is a theoretical model in the sense that it provides a hypothetical set of steps to be followed by non-media oriented educators and administrators in developing new educational systems plans. It is a pragmatically useful device only insofar as it outlines a series of practical steps to be taken by real persons

in preparing feasible programs for actual implementation in collegiate instructional settings.

It attempts to clear away some of the mystique associated with planning for and securing support for media. In its place a relatively simple and straightforward procedure is offered which will assist educational administrators and multi-media planners to successfully apply new media to the educational objectives of their institutions.

The procedure consists of six major activities with a number of sub-routines to accomplish specific ends. The major activities are as follows:

IDEATION
FORMULATION
PROPOSAL DEVELOPMENT
SUBMISSION AND FUNDING
IMPLEMENTATION
EVALUATION

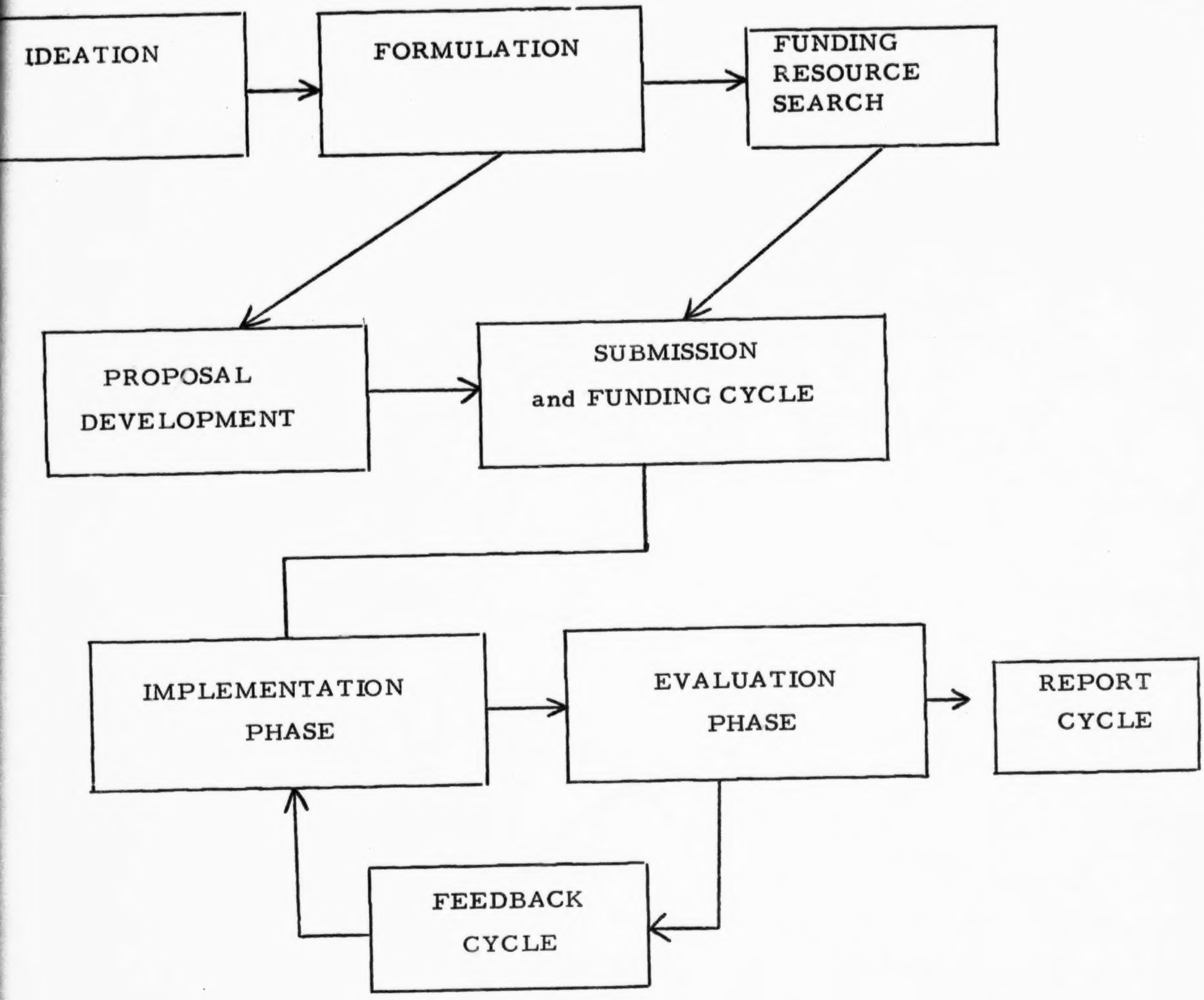
The study of the flow chart on the next page discloses the three additional sub-systems:

Funding Resource Search
Feedback Cycle
Report Cycle

Within each of the blocks of the systems diagram a number of procedures should be followed. On the following pages, descriptions of these activities are given.

a. Ideation. During this stage of planning for the acquisition of a multi-media system, the educational innovator should follow a systematic approach in the generation of ideas. A

CHART D - BASIC PLANNING STEPS/PRAGMATIC VERSION

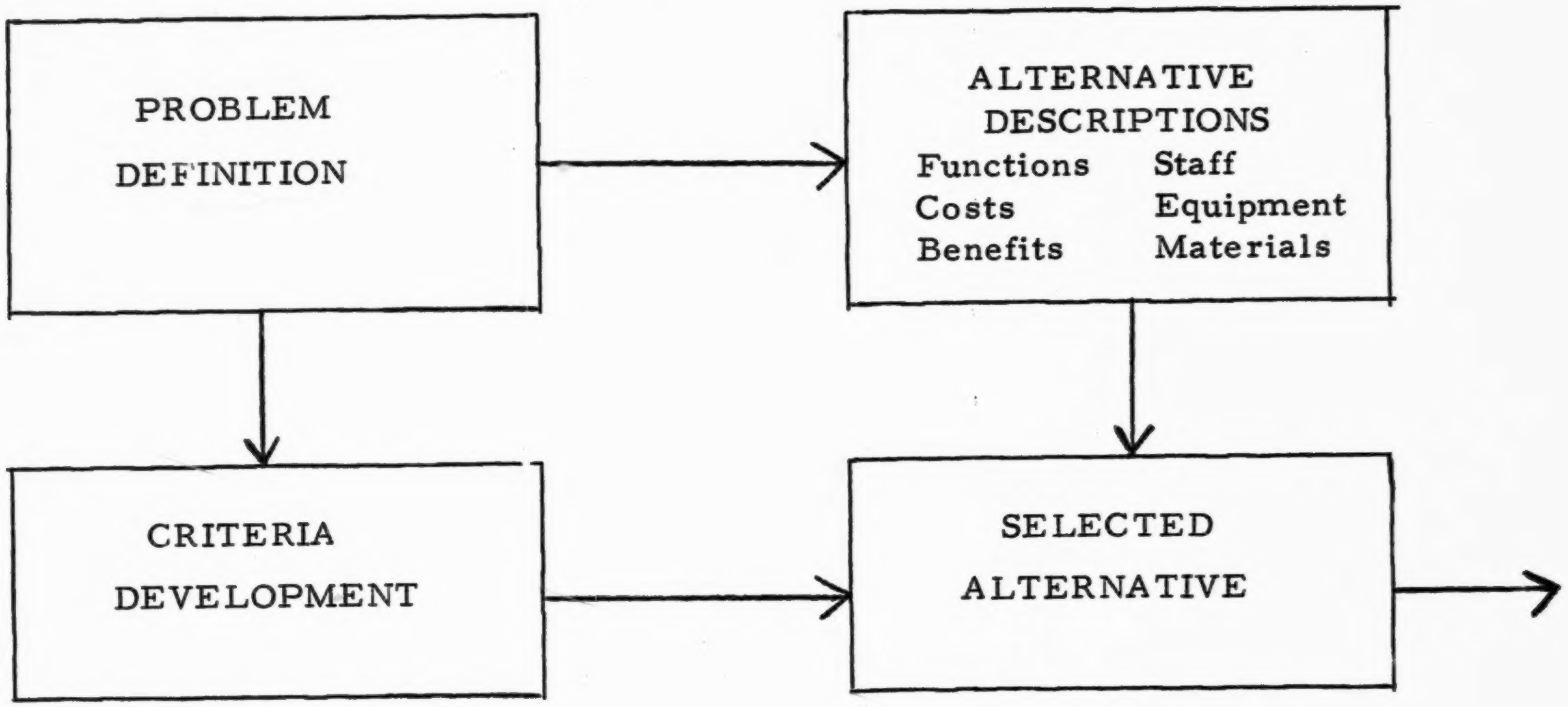

IDEATION
FORMULATION
FUNDING RESOURCE SEARCH
PROPOSAL DEVELOPMENT
SUBMISSION and FUNDING CYCLE
IMPLEMENTATION PHASE
EVALUATION PHASE
REPORT CYCLE
FEEDBACK CYCLE

considerable body of literature has been developed which could assist him in generating ideas. Most of the current work is being done in a relatively few centers. Notable are the studies in Oregon at the Center for the Advanced Study of Educational Administration (CASEA), in Ohio, Strategies for Educational Change (SEC), and through the National Training Labs' Cooperative Project for Educational Development (COPED). The steps described in the following paragraphs are the simplified synthesis of the concepts described in these studies. Four basic sub-systems are involved. These are shown in the chart on the next page.

(1) Problem definition. Ideas for multi-media applications usually arise in the context of some form of ongoing educational activity or problem. Some examples of educational problem situations which initiate action toward study of a multi-media application are (a) an increase in the number of students requiring a restructuring of the curriculum; (b) decrease in the number of skilled staff members which makes the use of media the only plausible means of employing staff members at the highest level of skills (tutorial), and (c) advancements in information technology which force an adaptation of the teaching program to the newer approaches. In any event, most new ideas arise out of need experienced in the educational context.

The planner should first define the problem which he is seeking to solve with the media application. The media innovation the planner has been thinking about may point to the problem for which it is offered as a solution. At this stage it is the problem which must be identified, rather than its solution. Premature identification of a solution will stifle a full analysis of the problem and the specification of a complete set of alternative solutions.

CHART E - IDEATION


PROBLEM
DEFINITION
ALTERNATIVE
DESCRIPTIONS
Functions
Costs
Benefits
Staff
Equipment
Materials
CRITERIA
DEVELOPMENT
SELECTED
ALTERNATIVE

The definition of the problem will normally go through a series of steps which involve increasing levels of specificity. During the process of defining the educational problem a good deal of effort should be devoted to discovering the real root problem and assigning a relative degree of importance to its solution. In fact, during the initial process of definition a number of subsidiary problems may be defined. This may in turn require an examination of the general and specific goals of the program. An estimate of the present degree of success in meeting those goals may be an additional by-product. While analyzing a high drop-out rate in engineering curriculum one may reveal another problem concerning the inadequacies of students completing an introductory mathematics course. Collecting data about this problem may help specify the number of students who are inadequately prepared for the engineering curriculum.

(2) Search for alternatives. After the problem has been clarified, a search for alternatives should be instituted during which the original multi-media idea should be re-examined. Other alternatives which may suit the problem should be sought. The existing teaching-learning system may well be considered as an alternative. Other possibilities which give promise of success in dealing with the problem may have emerged during the "problem definition stage." All should be described in some detail.

Some of the elements which should be included in descriptions of the alternative solutions would be: (a) a detailed statement of the proposed solution, (b) inadequacies of the proposal in terms of those criteria for a good solution for which the particular solution falls short of the optimum, (c) elements of new problems which will be created by the solution, (d) anticipated requirements for staff skills, teaching materials, equipment, space, costs, etc., (e) time required to implement, etc., (f) advantage of the proposed solutions, (g) side benefits received from the solution.

The extent to which the alternatives can be detailed in a readily comparable format will help in the later stages of planning.

(3) Criteria establishment. At the same time that the educational administrator is detailing a set of alternative solutions to the problem, he should be setting criteria which will permit him to select among the alternatives. This implies a careful study of the constraints which are operating. The criteria should specify the quality, quantity, and appropriateness of the various outcomes which might be expected from alternatives offered as solutions to the problem.

This activity should go on simultaneously with Step a. (2), "Search for Alternatives", and has therefore been shown on the attached flow chart as a parallel path. The product of Steps a. (2), Alternatives, and a. (3), Criteria, will be brought together during Step a. (4) below.

(4) Selecting alternatives. Given the set of detailed alternatives and the means for making the selection, the educational administrator opts for the alternative which gives the best general fit to the criteria. This selected alternative will be subject to review at a later date during the general Step b., "Formulation of Plan." For the present, this selection is made in order to provide a basic plan of action upon which the "Formulation" stage can be initiated.

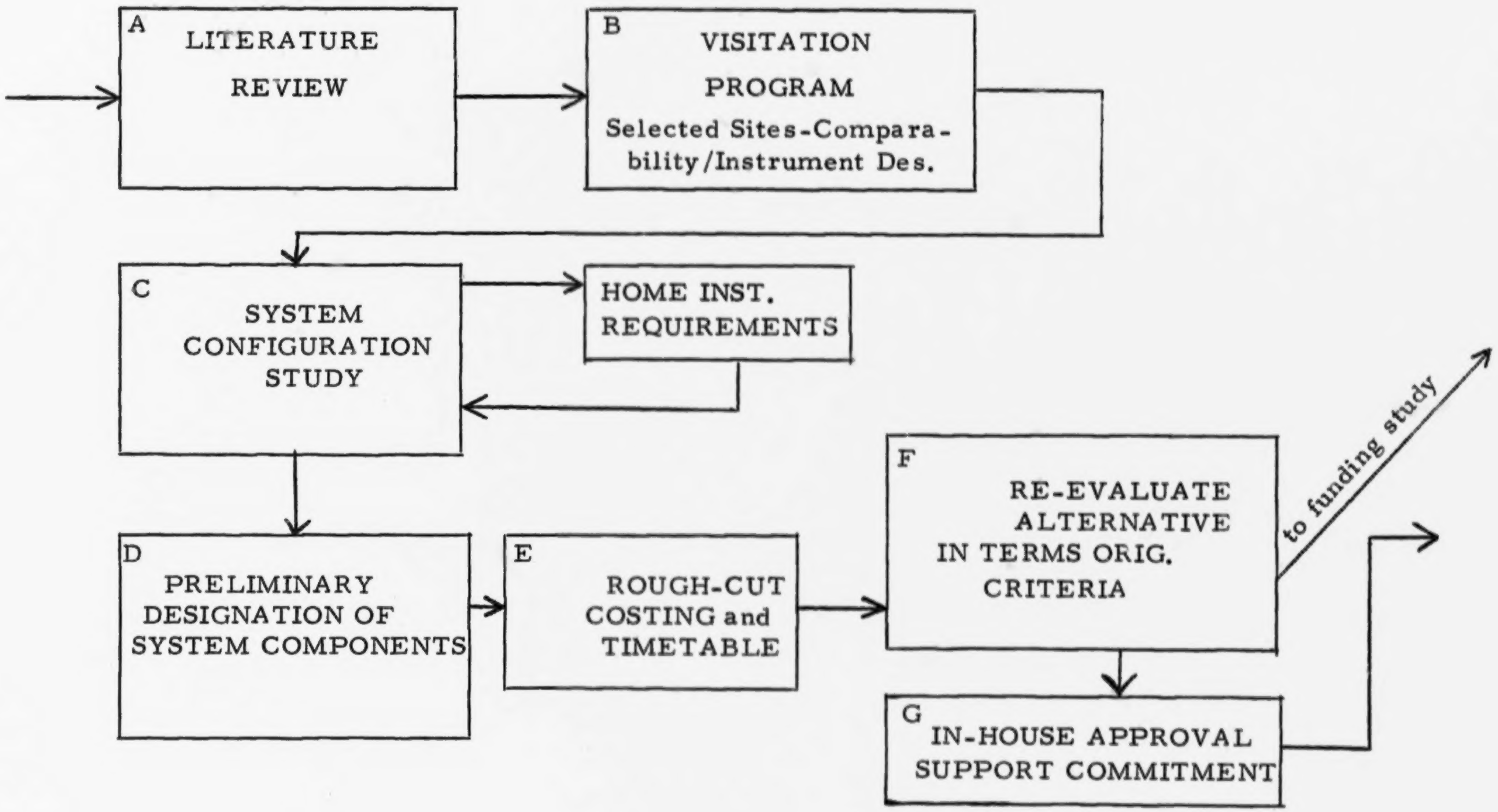
b. Formulation. The formulation of a more complete multi-media systems plan involves a number of steps. Among these are a review of the literature covering the specific media system (or category of media system) that has been selected. Based on this literature review a visitation program can be planned after which a system configuration study based on the home institution's peculiar needs can be conducted.

This study will in turn permit a preliminary designation of appropriate components. Designation of equipment, staff, space, materials and other elements will permit a rough-cut costing of the system. A tentative timetable for installation and implementation of the system should also be prepared. These documents then become the vehicle for a re-evaluation of the selected alternative in terms of the original criteria developed during the ideation sub-routine.

A strategic step in the formulation phase is the development plan for obtaining institutional approval for the concept under consideration. Each of the elements of the formulation sub-routine which have been identified above are shown in the chart on the next page and are considered in greater detail in the paragraphs following.

(1) Literature review. A thorough review of the literature should be performed. This review will produce several bibliographies. These bibliographies should be broken down by class of systems (for example, DAIRS, ETV, CCTV, VTR applications, CAI, PI, LL, etc.), and the various sub-classes within a system should be identified where logical separations of the literature can be made (for example, between ETV and CCTV).

CHART F - FORMULATION


A
LITERATURE REVIEW
B
VISITATION PROGRAM
Selected Sites-Comparability/Instrument Des.
C
SYSTEM CONFIGURATION STUDY
HOME INST. REQUIREMENTS
D
PRELIMINARY DESIGNATION OF SYSTEM COMPONENTS
E
ROUGH-CUT COSTING and TIMETABLE
F
RE-EVALUATE ALTERNATIVE IN TERMS ORIG. CRITERIA
to funding study
G
IN-HOUSE APPROVAL SUPPORT COMMITMENT

(2) Visitation program. After the review of the literature is complete, a visitation program should be initiated. The formulation phase should include the selection of an appropriate number of sites which have some comparability with the home institution.

The use of an instrument (FIELD) discussed later on will guide the information gathering effort.

The results of the visitation program should be drawn up in a document which lists the various pitfalls to be avoided, the special ingredients or elements to be considered, and the new variables which have been uncovered. This report and the literature review will become the basis for Step (3), "System Configuration Study."

(3) System configuration study. Upon completion of the visitation program and its resulting report, the educator should make a first attempt at specifying a system appropriate to the needs of his home institution. This will require a review of the product of paragraph a. (1) above, "Problem definition," and the product of paragraph a. (3) above, "Criteria for selection of an alternative." A further examination of the specific requirements in the home institution will be required at this point. Such a study might consider some of the following variables:

(a) Space (new construction or existing space)
(b) Staff
(c) Specification of function
(d) Materials specification
(e) Use levels
(f) Temporal requirements
(g) Expansion or conversion, etc.

(4) Preliminary designation of system components. This step can be carried out only after completion of the general configuration plan. This step involves the writing of specifications for a facility, if a facility is part of the plan. It is during this phase that electronic and mechanical components as well as human and information components will be identified in an appropriate degree of detail.

Examples might be: the selection of 8 mm over 16 mm projection equipment, the selection of vidicon TV camera and equipment vs. orthacon cameras, or the choice of cartridge loading tape decks over reel-to-reel models. Specific brands and models would not be identified at this time, but it would be expected that occasionally the functions or operations specified would be available only in the products of a single, specific manufacturer.

(5) Rough-cut costing and timetable. Based on the preliminary designation of system components a first effort can now be made to establish unit costs for the elements of the system. The basic categories for costing are as follows:

(a) Equipment (the hardware component)
(b) Staff
(c) Materials (information)
(d) Space

In each of the foregoing elements of cost a specific methodology was devised for the use of educators. In each case the methodology permits the full elaboration of appropriate schedules to indicate rough-cut costs. (Cost estimate is part of the FIELD; see p. 69 and ff).

(6) Re-evaluation of selected alternatives. At this point, the system specification, costs, and timetable should be

re-evaluated against the original criteria developed during the Ideation sub-routine (par. a.(4). In all likelihood the administrator or decision-maker will now be considerably more sophisticated in his application of the selection criteria that were generated in the early stage of the program. He may well have improved the criteria or reconsidered the original set of alternatives. In any event, the design should be subjected to a rigorous analysis at this point to determine its appropriateness for use in overcoming the original problem.

A departure of significant magnitude should be considered a warning against further effort. A full review and resolution of problems should occur before going on.

(7) Institution approval. The system has been elaborated in sufficient detail to permit its evaluation by faculty groups. Trustees and possible sponsors should also be permitted to study the plan which has been formulated.

If a single most important part of the Basic Planning Steps for Multi-Media Acquisition could be identified it might well be the plans for obtaining in-house approval. The number of excellent plans which have died in the faculty senate or molded away on the vice-president's desk are legion. But this very fact points the way to a gold mine of research information concerning strategies for obtaining approval. A careful, and possibly somewhat covert, examination of "past performances" should be undertaken. Learn as much as possible about past ideas (both successful and unsuccessful) so that an artful plan can be devised.

Some of the elements which should be considered in designing a strategy for obtaining approval are as follows:

(a) Combined use. Can allies be found for your scheme by offering the shared time use of the facility or system to other departments, programs, etc.?

(b) Alternative channels. Are there several "routes" to approval?

(c) Neutralization of threats. Can the engendering of negative reactions be avoided by careful analysis of the prerogatives, expectations, and aspirations of possible protagonists? (This step, the careful search for objections to the plan and the incorporation of modifications to circumvent or limit the intensity of objections may be the single most important element of the in-house approval cycle.)

(d) Funding alternatives. Effort should be devoted to determining one or more possible sponsors for the program and identifying the requirements each will impose on the program.

It should be remembered that acceptance of the multimedia concept is all that is expected at this in-house approval point. A further step will be described (after the proposal development cycle) which involves formal submission and the "real" approval which is evidenced by funding.

Part of the planning of strategy for approval should include a means for obtaining material evidence of the approval in the form of institutional support for proposal development activities. This need not necessarily involve very many dollars (for pilot programs, consultants, tests, etc.) but should include commitment of the time of specialists within the university or college hierarchy who can assist in obtaining the necessary information and preparing documents for inclusion in the proposal. Distribution of the load to others within the institution lightens it for the innovators while at the same time enlisting the positive support of a broader group of persons involved in the effort.

(8) Sponsorship study. Given approval by the trustees, faculty senate, dean, department head, or other approving authority within the institution; the initiator of the new media acquisition plan should press on to the next Phase - Development of a Proposal. It is well, however, to re-consider the possible funding resources or sponsors before too much effort has been devoted to the actual proposal. Therefore, a separate funding resource search has been indicated on the flow chart and will be described in the report.

A variety of funding agents exist. Perhaps several different federal government programs can be called upon to join in support of all or part of the system. Each may require different elements in a proposal. Frequently state and local governments can contribute funds for an equipment acquisition program if the proposal meets their specifications and demonstration needs. Foundations are often important sources of early funding. Frequently, they have special requirements in terms of the originality of concept or uniqueness of functions that will be provided. For these reasons the sub-routine of obtaining information concerning funding requirements should be initiated at the same time that the proposal goes into the developmental stage. Provision should be made to incorporate these learnings during the actual Systems Design stage.

c. Proposal development. If a program or project survives into the proposal development stage the initiator of the innovative multi-media system acquisition plan should be able to count on institutional resources for assistance. Ideally the in-house approval (obtained in paragraph b. (7) above) will include a commitment on the part of the department head, college dean, faculty, or trustees for institutional investment of time, energy, expertise and sometimes even money in the task of proposal development. At this point a larger team can be brought into the program. The information gathered during the Ideation and Formulation Phases can now be re-considered, analyzed and reworked into a more coherent proposal. The various staff members who will have operating functions during the implementation and evaluation stages should now be brought into the program to make their more specific contributions to the actual proposal effort.

This effort consists of a relatively diversified set of tasks which elaborate upon the original design. These various tasks can best be performed by specialists in each area. The proposal will not have an authentic quality without the direct participation of specialists in the various sub-fields.

More importantly, it must be a sound, uncomplicated statement (or commitment) on the part of these same specialists of the tasks they will perform (the part they intend to play) in the overall acquisition and implementation program.

For this reason, it is essential to involve (in addition to the administrator or decision-maker who has initiated or co-ordinated the original program) members of the following specialty groups:

Educational Process Specialist (Educational Psychologist);
Educational Materials Specialist (Editor/Graphics);
Subject Matter Specialist (Professor);

Facilities Specialist (Architect or Building and Grounds Specialist);

Finance Specialist (Business manager); and

Personnel Specialist (Staff recruiting).

An important additional group of practitioners must also be brought in at this time. These are the sales personnel for the various profit and non-profit organizations who may contribute to the overall program design. Of course the salesmen for textbooks, tapes, projectors and computers have an obvious part to plan in helping to define the components they could offer.

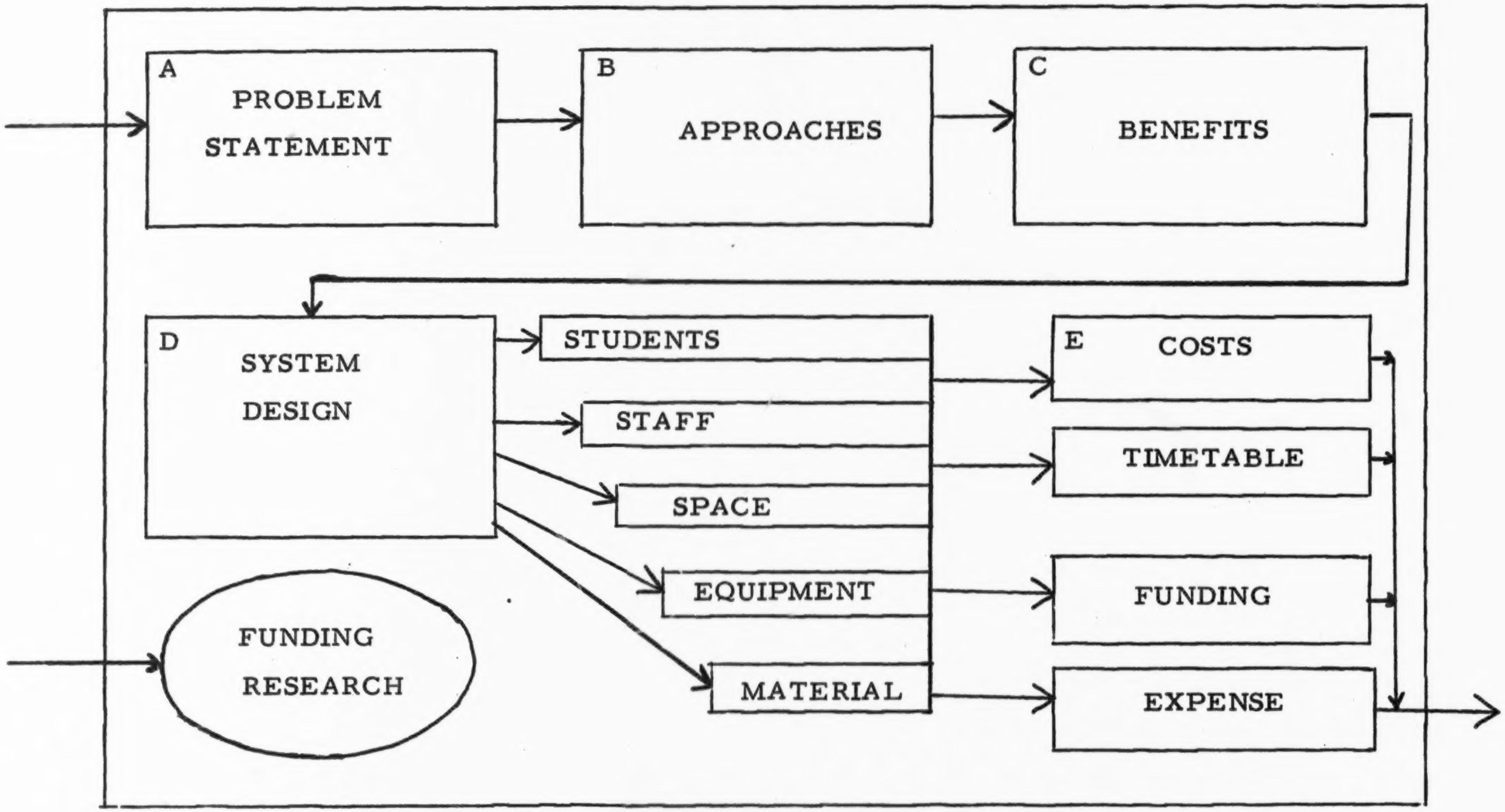
More obscure, but equally important, are the non-profit or consulting resources which may also be needed. An example is the consulting engineer who renders professional judgments concerning configuration of equipment components. Many multi-media acquisition planners will consider the appointment of an appropriate evaluation contractor (who can be expected to take an independent view of the program and render a judgment without fear or favor). The proposal development routine is shown in the chart on the next page.

(1) Problem statement. During this portion of the effort a clear and amplified restatement of the problem (defined earlier in par. a. (1) is written.

(2) Approaches. The various possible approaches (called alternatives) to the problem are restated. (The continuation of conventional instruction should be offered only if it is among the viable solutions to the problem).

(3) Benefits. The benefits of each of the approaches are identified and compared in as much detail as seems appropriate.

CHART G - PROPOSAL DEVELOPMENT


A
PROBLEM STATEMENT
B
APPROACHES
C
BENEFITS
D
SYSTEM DESIGN
STUDENTS
STAFF
SPACE
EQUIPMENT
MATERIAL
E
COSTS
TIMETABLE
FUNDING
EXPENSE
FUNDING RESEARCH

(4) System design. The selection of an appropriate approach is restated in considerable detail, giving the rationale for the selection of that approach and its benefits. Having given the rationale for the selection of this alternative, the proposal should then offer a detailed description of five basic elements of any system design: the proposed student body, the staffing, the space requirements, the equipment package, and the teaching materials procurement plan.

(5) Costing section. A section of the proposal should be included which clarifies and extends the costing developed during b. (5). Accounting practices, procurement plans, etc. should be covered.

(6) Timetable. In order to make clear the specific personnel and start-up problems which can be expected to occur during the course of an implementation cycle, a timetable should be developed which gives such details as the following:

- Student use tables showing input-throughout-output; hours of use, etc.
- Manpower loading during planning and design stages, start-up stages, and the steady state manpower expectation.
- Space requirements and plan as the program grows (be sure to match with student growth expectation)
- Equipment phasing table showing when various elements of equipment will be required and the accumulated costs of same (be sure to also show equipment attrition, maintenance costs, margins for spares, etc.)
- Procurement chart showing the order placing dates, payment dates, etc. for the acquisition and/or development

of appropriate materials for use in the system. The cost (in manpower) for local development of teaching materials should be reflected in the staff manpower loading charts given above.

(7) Funding plan. A complete funding plan should be developed at this time. Institutional resources, alumni funds, special grants from foundations and local, state and federal contributions should be identified. Special conditions of lending institutions should be explicitly stated. The timetable of funding requirements should be backed up by adequate documentation of the "if-then" contingencies in the funding procedure. It is important to let each organization that will participate in the funding of the multi-media system know exactly what other groups and contingencies are involved in the funding procedure.

(8) Risk of refusal. It is well to indicate in the proposal some of the expected outcomes for second and third alternative approaches which would be used in the event that the proposed multi-media system is not acquired and put to use. These often can be best stated as expected expenses which will be incurred if the proposed effort is not carried out. Expenses are not always financial. A severe and progressive weakening of a language or engineering program can best be demonstrated if it is compared to the program of a neighboring institution where the language labs or computer assisted instruction in engineering are demonstrably effective. This can be a persuasive item of expense which an institution may incur if it does not move forward along the new educational technology path. These pragmatic losses or anticipated risks should be well-documented in a proposal.

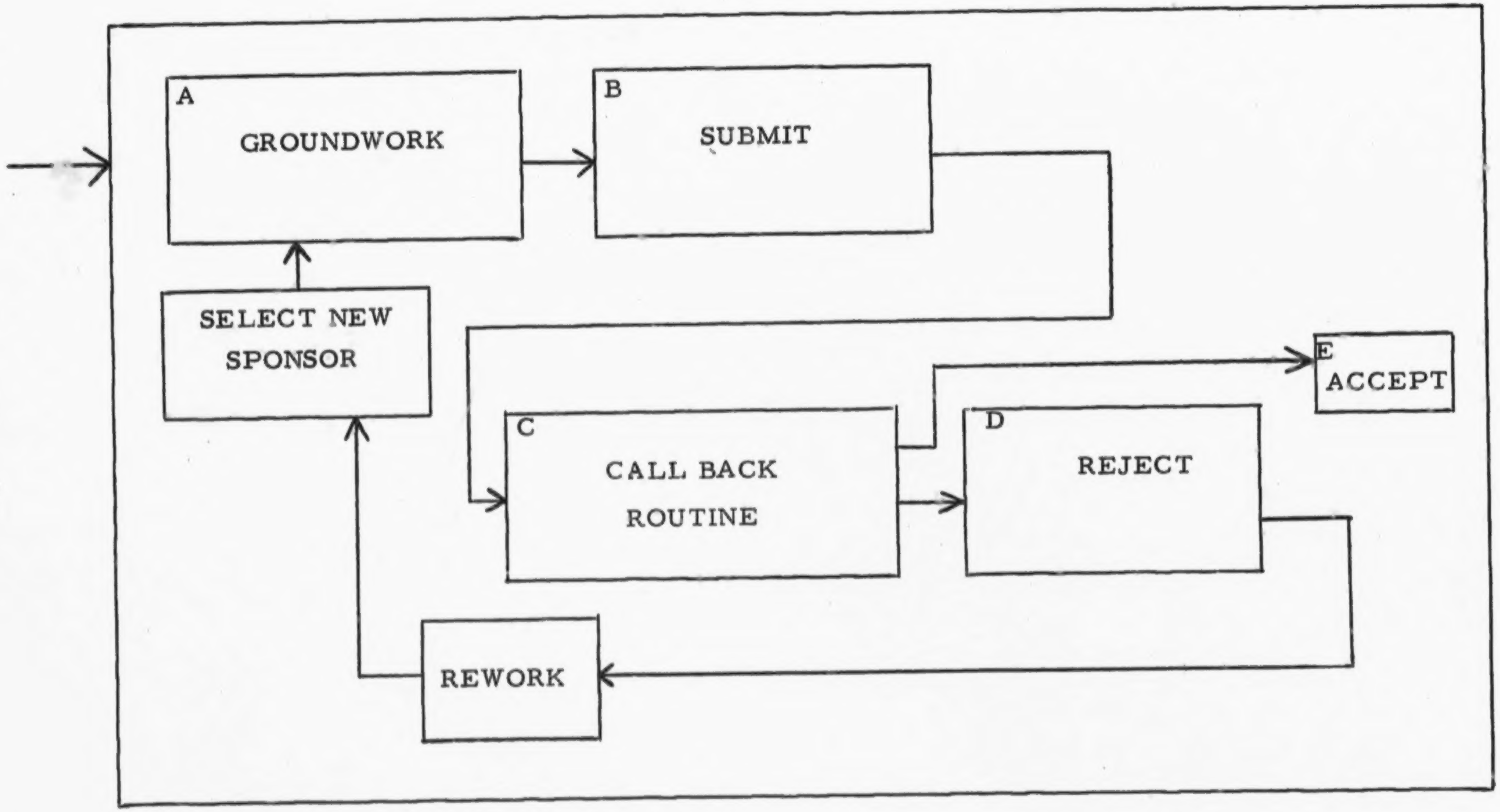
d. Submission and funding cycle. Given an appropriate, accurate and persuasive proposal, the next step is the carefully planned submission of the proposal. Already time will have been devoted to the study of funding resources. This search is normally conducted by the administrator among alumni groups, government agencies, or other resources. To one degree or another this effort will shape the proposal (as has been discussed in par. c. above. It will also, of course, influence the submission and funding cycle. The Submission and Funding Cycle is shown in the chart on the next page.

Many colleges and universities have a "development office," an "alumni relations office," or a research and grants administrator. Wherever possible these specialists should be involved at the earliest possible stage. Their advice, counsel and review should be sought during the stages identified in Phases a, b., and c. above. But their special skills come into play most pronouncedly during the submission and funding cycle.

The attached flow chart indicates several important subphases: groundwork, submission, call-back routines, reject, rework, and acceptance. Each of these phases is an important element of the submission and funding cycle.

(1) Groundwork. Field calls on each of the possible funding resources and careful study of their requirements and application forms should be undertaken well in advance of the submission of the proposal. The investigation should include research into the timetable which funding agencies follow as well as the amounts of funds available. The expectations and decision-making criteria of the personnel involved in making the funding decisions should be understood. The more complete the planning and execution of a submission and funding cycle becomes, the greater are the chances of acceptances and implementation. Advance notice of

CHART H - SUBMISSION AND FUNDING CYCLE


A
GROUNDWORK
B
SUBMIT
SELECT NEW SPONSOR
C
CALL BACK ROUTINE
D
REJECT
E
ACCEPT
REWORK

intention to submit a proposal often helps. Pre-submission conferences based on draft documents may disclose repairable faults. A receptive understanding of unwritten aspects of the problem can often be engendered.

(2) Submission. The proposal is offered to the sponsoring agencies with a short covering letter requesting favorable action and reciting, in simple, compelling terms, the merits of the proposal and the risks involved in its refusal.

(3) Call-back routine. It is not sufficient to simply offer a proposal to a prospective sponsor. One must also be persuasive in delicately calling his attention to the need for action. The unsubtle attempt, however, to apply pressure of some sort frequently has the effect of aborting the mission. Therefore, the creation of a delicate sense of urgency without the implication of threat or pressure often has the desired effect. During the planning phase it is well to work out a number of "excuses" for maintaining contact with the persons along the decision tree where a funding decision will be made.

(4) Rejection of proposal. From time to time a proposal meets unfavorable reception. Usually several options remain open. And one significant strength has been added: that of experience.

During the reaction to the rejection of a proposal, a very careful effort should be undertaken to determine what parts or elements of the proposal (or what funding limitations of the sponsoring agency) resulted in the denial of the application. Frequently, such information is useful in re-writing the proposal for subsequent submission. In any event, all information on the reasons for rejection should be passed along to the proposal writing team, to help during rework of the proposal in a second version for submission to a new sponsor.

The possible receipt of rejection evidence should be considered during the original planning. Appropriate cut-off dates and withdrawal dates should be determined. After a proposal has been on the sponsor's shelf for a certain length of time it should be subject to withdrawal and submission to another possible sponsor. Wherever possible the specifications for re-work of the proposal to meet a second sponsor's needs should be developed in advance. This way the changes necessary for a new sponsor can be initiated, even though the originator is reeling from the impact of rejection. (Having a plan or a useful course of action at this point in time often results in resubmission to the same or different sponsor.

Selection of a second sponsor is an important subphase of the rejection activity. If an effort has been made to identify alternative sponsors during the sponsorship study (identified in d. above) , then, it may be possible to resubmit the proposal to a different sponsor almost immediately.

(5) Acceptance. Acceptance of a proposal by a funding agency should be the signal for the direct and rapid implementation of the early steps envisioned in the proposal. Several checks, however, should be carried out before moving too hastily. Some of these are:

(a) Wait for a contract: It is foolhardy to commit money (or staff energy) to a program without, at the very minimum, a "letter of intent" which describes the sponsoring agency's degree of commitment to the program.

(b) System review: Word of acceptance should be followed by a very careful system review incorporating all the personnel mentioned under c. above, and re-studying the feasibility of doing that which has been proposed. If the sponsor has imposed new conditions, reduced the dollar value of the grant, or otherwise placed significant qualification on the proposal, then the proposal team should re-adjust their plans to meet the new needs.

e. Implementation. During this phase a series of assignments and follow-up checks concerning the different responsibilities will be carried out. The central responsibility is, quite obviously, an administrative and management task. In order to carry out these operations college administrators may require some assistance in the form of generalized checklists of events and types of activities which must be undertaken. Rather than detail here the fairly well-defined management techniques, we will simply indicate several paragraph headings and the possible content for that paragraph:

(1) Assign monitor or program manager

(2) Establish responsibilities (within institution and outside agencies and constraints)

(3) Determine priorities

(4) Plan accounting techniques and methods

(5) Initiate staff search, recruiting, etc.

(6) Initiate PERT or CPM planning and review methods

(7) Establish a technique for reporting and feedback to sponsor

(8) Work out a dry-run plan and criteria for determination of its effectiveness

(9) Develop scheme for emergency decision-making and plan-change authority

(10) Attempt to predict typical pitfalls for wet-run operation and provide solutions

f. Evaluation. The apparatus for evaluation will have been simply and clearly developed during stage a. (3) (Criteria establishment), during stage b. (3) (in which the system configuration study considered the requirements of the whole institution), and in phase c. (3) of the proposal development routine during which the expected benefits of the system implementation were defined.

Unless a carefully designed evaluation mechanism is followed,the rest of the educational community will at a loss to determine whether or not the innovating institution has found a new educational tool. Thus the evaluation subsystem should refer back to the following elements and carry out steps or programs as indicated below:

Criteria design
Observation methodology
Effectiveness measures
Units or quantitative increments of benefits
Cost accounting reviews
Cost per unit of benefit

The cost per unit of benefit mentioned above will be seen to be a difficult element to incorporate in a system for planning multi-media acquisitions in the field of Higher Education. However, a first step should be taken toward the involved and arduous data collection activities needed to carefully assess the cost and effectiveness of instructional systems. If this way of stating the case for cost effectivness seems too harsh for academicians, let them remember the taxpayer. The taxpayer's dollars are becoming a larger and larger factor in the educational funding equation. Careful analysis of every college's expenditures is expected. As the gap widens between the public's expectations and the ability of colleges to perform this analysis, colleges can expect intense scrutiny and quite possibly some severe criticism of their efforts.

I - HISTORICAL DEVELOPMENT

C. Teaching/Learning Strategy Description

This section focuses on a critical process in the overall educational planning activity. An assay of the broad objectives of the media system will identify the objectives of the instructional units which comprise the educational system. A process for identifying these objectives, analyzing them and specifying the media elements which promise to serve these objectives is described here.

1. Statement of the problem. Educational planners and decision-makers at all levels need systematic procedures to collect and organize information for instructional design, as well as evaluation techniques for continuously assessing the quality of their decisions.

In the specialized area of instructional media selection, educators are particularly in need of carefully designed and proven procedures because innovative educational technologists offer such a wealth of approaches, devices, systems, etc., from which to choose for any imaginable instructional task. No well-documented rational method now exists for selecting the media of instruction best suited for accomplishing a particular educational objective.

A strategy is needed, then, which through analysis of educational tasks and instructional resources (i.e., media characteristics), assures optimal matching of educational tasks or goals with media instruction. Such a strategy must consider several essential elements:

a. What are the specific educational objectives to be achieved?

b. What types of learning activity are involved in the educational tasks?

c. What are the conditions surrounding the learning situation?

d. For the type of learning and conditions of the learning situation identified, what media characteristics are required?

e. What are the characteristics of available media systems?

2. Solution. The most critical element of the strategy is determining the relationship between an educational goal and the characteristics of media systems. This relationship, in other words, is that which is found to exist between the expected outcome of instruction and the alternate approaches to instructional presentation producing the learning.

A five step process for determining the media suitable for accomplishing specified educational objectives follows:

a. STEP ONE - Prepare behavioral objectives, i.e., state in behavioral terms the objectives for the course element or unit of instruction.

The important components are:

Action Verbs
Locus of Action
Antecedent situations, etc.

b. STEP TWO - Describe the types of learning which can be inferred from the specified behaviors. Select one or more types from the learning categories.

When selecting learning categories, the selection is to be made among:

Verbal Association
Multiple Discrimination
Perceptual Motor Skill Learning
Concept Learning
Principle Learning
Problem Solving

c. STEP THREE - With these behaviors and learning types in mind describe one or more instructional strategies which are being or could be used to accomplish the objectives. Write the teaching/learning strategy description in such a way as to include the following elements:

Each situation can be described in terms of:

(1) Mode of Instruction
    (a) Presence
        Live
        Recorded
    (b) Ratio of Personnel
        Group
        Individual

(2) Sensory Mode
    (a) Recording/Delivery Symbology
        Iconic
        Digital

- (b) Receptor Mode
  - Visual
  - Auditory
  - Kinetic
- (3) Feedback to Student
  - (a) Immediacy
    - Immediate
    - Delayed
  - (b) Symbology
    - Iconic
    - Digital
  - (c) Specificity
    - General (i.e., correct/incorrect)
    - Corrective (tells what's wrong or right)
    - Prescriptive (tells what to do next)
- (4) Provision for Student Response
  - (a) Immediacy
    - Immediate
    - Delayed
  - (b) Expression level
    - Constructed
    - Covert (unemitted)
    - Selected

d. STEP FOUR - Identify the various media alternatives which best fit the objectives and instructional strategy description.

One procedure for exploring system component alternatives is to examine the following list of media elements. It is organized into general classes of "Verbal and Pictorial," and is further broken down according to the form of the "realness" of the message (i.e., still vs. motion and printed vs. uttered) and into sub-classes based on the physical properties of the medium (i.e., paper, film, oxide, etc.).

(1) Verbal
    (a) Printed
        (1) Film
            (a) Microforms (i.e: ERIC materials)
            (b) Stripfilm (i.e: MAST device)
            (c) Transparencies (i.e: Vugraph)
            (d) Slides (i.e: 2 x 2 and lantern)
        (2) Paper
            (a) Books (the text material in pamphlets, texts, et al)
            (b) Worksheets (handouts-charts-forms)
            (c) Panels/Charts (bulletin boards, posters)
            (d) Games ("Battleship" and paper simulations)
            (e) Roll forms (teleprinter, computer printout, etc.)
            (f) Embossed Sheets (Braille forms, punched cards, etc.)

    (b) Spoken
        (1) Oxide on film
            (a) tape (1/4 in audio tape)
            (b) disks (computer memory)
            (c) belts (dictating devices)
            (d) flat stock (Polyflax device)
            (e) stripe on film (8 & 16 mm)
        (2) Radio (broadcasts for educational uses)
        (3) Optical
            (a) on film edge (16 mm & 8 mm optical track)
            (b) in alternate frames (Kalart device)
        (4) Mechanical
            (a) discs (recordings)
            (b) belts (dictaphone, etc.)
        (5) Realia (live, spoken lectures)

- (c) Manual
  - (1) Semaphore (flags, blinker, etc.)
  - (2) Hand signs (deaf manual alphabet, etc.)

- (2) Pictorial
  - (a) Still
    - (1) Film
      - (a) Filmstrips (35 mm single frame)
      - (b) Slides (2 x 2 and lantern)
    - (2) Paper
      - (a) Books (the pictorial material in manuals, texts, et al)
      - (b) Loose Sheets (pictures, maps, other flat representations)
      - (c) LDX/FAX (long distance Xerography, Facsimile, etc.)
    - (3) CRT
      - (a) Conventional TV (used for still transmission)
      - (b) CRT still devices (Hughes TONOTRON, Westinghouse, etc.)
    - (4) Realia
      - (a) Objects (lab. instruments, training devices, etc.)
      - (b) Kits (construction exercises)

  - (a) Motion
    - (1) Film
      - (a) 8-16-35 & 70 mm Film (conventional reel to reel)
      - (b) 8 & 16 mm loops (cartridged lessons)
    - (2) Tape
      - (a) VTR (video-taped lessons & exercises for playback)
    - (3) TV
      - (a) Conventional CCTV and open circuit uses)
    - (4) Live
      - (a) Demonstrations (by instructors, pre-planned)
      - (b) Role-play (simulations, games played-out by students and discussed)

e. STEP FIVE - Select the one medium which provides an optimum fit for the characteristics disclosed in steps one, two, and three from among the alternatives generated in step four. The procedure should result in the preparation of a media specification for a particular unit of instruction. Usually it will call for one media class but in some cases it will result in a mix of media.

The Media Specification should contain such elements as scripts, story boards, input and output test items, and a determination of its place in overall curriculum.

Instructors can use the procedure to describe objectives, to identify the types of learning involved, and then move on to describe the instructional strategy. Based on this combination of instructional design activities, they can then determine the types of media which would be most effective.

3. Procedure utilization. First the instructor specifies the behavioral objectives for a unit of instruction. For the purpose of selecting a medium, each behavioral objective is considered separately. A process for selecting the optimum medium (or a mix of media) for a grouped series of behavioral objectives (which are considered as one unit of instruction) is described later.

The instructor next identifies the learning category(s). These can be deduced in part from the terminal behaviors which he has described. To assist him, examples of educational objectives and their accompanying learning types can be provided.

The instructor now makes a number of decisions concerning the optimum mode of instruction. He specifies a teaching/learning strategy in some detail. This includes:

o Instructional mode: group or individual and live, remote, or recorded

o Sensory mode: an iconic or digital presentation. The sensory mode will be either visual, auditory, kinetic or a combination of these

o Response mode: the instructional strategy will include information on the type of response to be elicited from the students

o Feedback mode: the instructor will also indicate the type of feedback to students regarding responses which they make during an instructional presentation.

The instructor has now prepared a Teaching/Learning Strategy Description (T/LSD) which identifies the characteristics of the instructional strategy which he will follow to accomplish educational objectives he has stated.

Using the behavioral objective, learning category and teaching/learning strategy description, the instructor refers to materials which will help him identify a set of media alternatives which are appropriate for the support of his instructional strategy.

For example, if he has identified conceptual learning as being implicit in his preferred mode of instruction, audio delivery of digital symbology as the sensory mode, provision for immediate constructed response by student, but no requirement for feedback, he will find that this combination of elements is characteristic of Dial Access w/workbook; radio programs w/workbook; phonograph record w/text; etc.

After selecting a medium for the first objective, the instructor would then repeat the process for other behavioral objectives. By listing the objectives and possible media side-by-side the instructor then visualizes a pattern of media usage for the entire instructional unit.

He may discover that one type of medium appears repeatedly as an alternative for many of the objectives. Therefore, he may decide to use a single medium to support the instructional strategy for the entire unit.

On the other hand, he may find that several media are required to support the entire instructional unit. If the latter is the case, the instructor will strike the best compromise between the most logical sequence of presentation of course material in the unit and the most practical sequence of media utilization. (See Briggs reference, Chapter III).

I - HISTORICAL DEVELOPMENT

D. Evaluation of Multi-Media Systems

1. Examination of the variables. The evaluation of a proposed or presently operating media system is a key phase of the media system planning process. This evaluation requires a means for systematically and objectively collecting data about the media system. To meet this requirement, AIR expended considerable effort in the development of a data collection instrument, the final version of which could be administered, summarized and interpreted in the field, on-site by an institution performing a self-evaluation.

The first step in developing such an instrument was to specify those variables which are significant to the evaluation of media systems. A list of the variables identified appears below.

VARIABLES LIST

a. Identification
    (1) Institutional identity
        (a) Clientele
            (1) Age
            (2) Family income
            (3) Percent commuters
            (4) College Entrance Examination Board cutoff score
            (5) Cultural factors
            (6) Religious orientation
        (b) College
            (1) Generalized goals or type
            (2) Location

      - (3) Size in student numbers
      - (4) Organizational structure
      - (5) Alumni influences
    - (c) Faculty
      - (1) Number
      - (2) Percent research
      - (3) Percent teaching
      - (4) Academic percentages
      - (5) Salary levels
    - (d) Facility
      - (1) Number of buildings
      - (2) Size of buildings
      - (3) Total square footage
      - (4) Scattered vs. compact
      - (5) Age of plant
      - (6) Cost of maintenance as percentage of gross plant value
  - (2) Identify system
    - (a) Originator
      - (1) Title
      - (2) Goals
      - (3) Funding sources
    - (b) Plans
      - (1) Original design
      - (2) Development stages
    - (c) Implementation
      - (1) Start-up headaches
      - (2) Operational problems

b. Performance

- (1) Student variables
  - (a) Numbers
    - (1) Numbers into the system
    - (2) Number of drop-outs
    - (3) Number out of the system
    - (4) Percentage attendance or use
    - (5) Use voluntary or compulsory
  - (b) Personal
    - (1) Age
    - (2) Sex
    - (3) IQ
    - (4) Prerequisites for this sample
    - (5) Interest measures
  - (c) Throughput
    - (1) Input testing of baseline knowledge or skill
    - (2) Output testing of baseline knowledge or skill
    - (3) Past numbers of output students
    - (4) Present numbers of output students
  - (d) Academic
    - (1) Achievement measures
    - (2) Attitude change measures
    - (3) Is system use high?
    - (4) Is system use increasing?
  - (e) Elective
    - (1) Number selecting course
    - (2) Number taking follow-on courses
    - (3) Career selection information

        - (4) Career satisfaction information
    - (f) Temporal
        - (1) Percent of time saving over conventional instruction
        - (2) Or use more time with system instruction?
        - (3) How assign value to student hours?
- (2) Staff variables
    - (a) Definition
        - (1) Have task analyses been written for staff jobs?
        - (2) Do descriptions exist?
        - (3) Are performance evaluations carried out?
    - (b) Professional staff
        - (1) How many persons give how many hours?
        - (2) Are these book hours vs. actual hours?
        - (3) Is training provided (type, length, locale, and curriculum)?
    - (c) Technical staff
        - (1) Number of persons and hours of duty
        - (2) Are these hours spent monitoring, really working, (i. e., intensity of involvement)?
        - (3) What level of competence is expected?
        - (4) Is training provided (amount, cost, curriculum)?
    - (d) Student assistants
        - (1) Number of clock hours of paid student assistance
        - (2) Number of clock hours of volunteered student assistance

        (3) Required levels of activity for student assistants
        (4) Types and expense of training provided to student assistants

(3) Equipment Variables

    (a) Descriptors
        (1) Written description of system
        (2) Use checklist of input and response options to specify media mix
        (3) Obtain copy of specifications for system
        (4) Product literature on components of system
        (5) Special hook-ups or relationships unique at this setting

    (b) Fidelity
        (1) Lines of raster for television
        (2) Frequency response characteristics of audio portion
        (3) Resolving power of image projection system
        (4) Legibility and type size of paper inputs

    (c) Reliability
        (1) Down-time
        (2) Materials damage
        (3) Percent frequency failure during use
        (4) Percent class time lost for all reliability reasons

    (d) Cost/life
        (1) Original costs
        (2) Maintenance costs
        (3) Replacement costs

            - (4) Expected life of equipment
            - (5) Actual in-use life of equipment
            - (6) Computed cost per unit of equipment life
- (4) Teaching material variables
    - (a) Sources
        - (1) Purchased
            - (a) Suitability
            - (b) Percent use of purchased information
        - (2) In- house developed
            - (a) Percent use of home-made
            - (b) Cost of development (include all staff time and materials)
            - (c) Life expectancy of home-developed
    - (b) Cost/life
        - (1) Accumulate cost and life information on off-shelf and in-house materials to determine cost per unit of student use
    - (c) Quality factors
        - (1) Ratings of independent judges
        - (2) Ratings of students
        - (3) Fidelity level of input materials (equipment variables, see "Fidelity" above)

2. An experimental, respondent- oriented evaluation instrument: FIELD. Questions were constructed to gather information about these variables. These questions were then structured to form the data collection instrument which was named FIELD (Field Instrument for Evaluation of Learning Devices). More about the construction and use of FIELD follows.

a. Data collection. Information was collected along two general dimensions: predictor variables and criterion variables. Predictor variables are those many factors and elements of the teaching/learning system design and operation which might be expected to have bearing on the effectiveness of the system. Criteria variables are the few factors which serve as output measures or comparisons of students' accomplishment with collegiate goals. The variable classes consisted of the variables listed earlier categorized under these two areas.

Both types of variables were further broken down into other general clusters:

- STUDENT Variables
- STAFF Variables
- EQUIPMENT Variables
- TEACHING MATERIAL Variables
- FACILITY Variables.

b. Data sources. Various data sources were tapped by on-site visitation teams. The four major avenues for application of the tool were:

- On-site inspection of the multi-media system in operation
- A study of the original plans and other documents associated with the development and use of the system
- Depth interviews with the technical and professional staff of the system·

- Interviews with students both in process and those who had finished using the system or dropped out of it

c. Selection of participating MM systems for inclusion in the pilot study. It was proposed that at least one system from each of the categories listed above (print-structured, audio-linear, local multi-media, electronic distribution, and student activity) be selected for intensive study during the pilot trial runs of the FIELD. Language laboratories have achieved wide acceptance. Each institution of higher education selected for study had a language laboratory, in addition to the specific system under study, which was also analyzed with FIELD.

d. Activity schedule. Since an evaluation team had to go into the field and conduct the study, it seemed important to select institutions which were receptive to the concept of the FIELD development. Therefore, to select such a group of institutions, the activity schedule outlined below was followed:

(1) Contacted a selected group of educators (with specialized skills and interests).

(2) Requested that they serve as members of a panel to review the first draft (FIELD) in early December, 1967.

(3) Invited this panel of experts to meet with AIR staff during a training period in early January.

(4) Met with experts to plan the administration and interpretation of FIELD.

(5) Asked panel members to "volunteer" the media system at their home institution as a guinea pig for the first round of elevations. (Thus, the panelists would have an opportunity to influence, if not control, the structure of the evaluation instrument and to participate in the briefing of AIR staff prior to the administration of FIELD).

(6) After development of a final instrument incorporating the best understandings generated by AIR staff and supplemented by panel members' contributions, assigned AIR staff to two-man teams to take FIELD to the pilot institutions for experimental administration.

(7) Analyzed results of pilot administrations, prepared FIELD study findings and specifications for NEW FIELD.

e. Timetable. Activity in late October and early November was devoted to the design of a preliminary instrument and to the selection of a panel of experts.

During November and early December the panel, (having volunteered the use of their multi-media systems as vehicles for the FIELD development) was employed by AIR as consultants to assist in FIELD de-bugging and development. In late December, a second generation version of FIELD was completed and a two or three day meeting was held in January at a central location.

This meeting was attended by the panelist-consultants and AIR staff. Based on the further de-bugging and training activities which took place at that time, a final instrument was developed at AIR.

This was applied by field evaluation teams of two persons each at the volunteer institutions. AIR staff worked with panelists to arrive at an appropriate FIELD reporting system.

II FIELD STUDY

A. Methodology

1. Purpose. The purpose of the Field Instrument for the Evaluation of Learning Devices (FIELD) is to produce useful information concerning the cost, utilization, pattern, and overall effectiveness of existing and future multi-media systems in higher education.

2. Instrument design: variables. The first draft of FIELD was built upon the list of predictor variables and criteria variables described earlier.

From the list, a series of individual questions designed to elicit data concerning each variable was prepared. They were organized into three booklets. One booklet asked questions identifying the institution. The other two asked questions on the personnel (students and staff) and equipment and software variables.

These questions were prepared in an item-by-item format with space for panelists to indicate:

- How best to obtain the material (respondent category) and
- What format to use in obtaining the information (instrument category).

Upon completion of the full set of questions, this draft material was mailed to participating media specialists.

3. Panelist selection. Panelists were selected for their special knowledge and interest in specific classes of systems. Each panelist came from a university or college where two or more multi-media teaching systems were in use.

Once the list of media specialists and systems was established, panelists were contacted and requested to serve as consultants to review the first draft of the evaluation instrument. Each was asked to volunteer the media system at his home institution as a site for a tryout of the FIELD. This gave the panelists an opportunity to influence the content and structure of the evaluation instrument. Panelists participated in the briefing of AIR staff prior to the visits to their campuses for the administration of the FIELD.

The media specialists, universities and media systems represented were:

Panelist and Institution	System class	Specific systems
Lawrence Stolurow	Printed Structured	CAI
(Harvard U.)	Audio-Linear	Language Laboratory
John Childs	Audio-Linear	DAIRS
(Wayne State U.)	Audio-Linear	Language Laboratory
	Active	VTR (micro-teaching
Kenneth Fishell	Local MM	Multi-Media Classroom
(Syracuse U.)	Audio-Linear	Language Laboratory
Harvey Meyer	Distributed MM	CCTV
(Florida Atlantic U.)	Audio-Linear	Language Laboratory

4. Revision activities. The first working draft of the FIELD was completed and sent to the consultants in the form of three pamphlets:

(a) Performance, Equipment, Materials
(b) Performance, Student, Staff
(c) Identification, Institution and System

Panelists were asked to assign respondent and instrument categories as indicated below:

Respondent Categories

Student
Technician
Professor
Other____________

Instrument Categories

Questionnaire
Interview Schedule
Other____________

Along with assigning means and sources according to respondent and instrument categories, panelists were asked to weed out those questions which were inappropriate, amend others, and include additional questions as required.

5. Preparation of interim draft. As the evaluations were returned, a method for restructuring the FIELD questions for consideration by the panel was established. The respondent categories were expanded and used in conjunction with such factors as cost, time, affect measures, goals and effect, and system description.

A chart is attached indicating the pigeon-holes into which questions were sorted for the interim draft, according to respondent and type of information called for. The resulting sets of questions were numbered and considered in batches during a meeting of panelists convened for that purpose. The second draft was finished and the panel meeting was held 11 and 12 January 1968.

The media specialist-consultants attended together with AIR staff members Dr. Harold P. Van Cott, Dr. George Johnson, Dr. Ronald Carver, Mr. Charles Williams, Mr. Christopher Faegre, Mr. John Connolly and Dr. Ray Muller. Other panel members were: Dr. Tongsoo Song, Mr. Peter Esseff, and Mr. Alfred Dubbe from the U.S. Office of Education. The panelists discussed the contract objectives and the short-term conference

CHART I - INTERIM FIELD

			RESPONDENT CATEGORY						
			Students		Teachers		Technicians	System Director	Administrator
	INFORMATION CLASS		Randomly Selected	System Users	Randomly Selected	System Users			
COSTS	Costs, Start-Up								
	Costs, Operating								
TIME	Time, Start-Up								
	Time, Operating, Staff Students								
	AFFECT MEASURES								
GOALS	Determining Objectives								
	Affect Measures								
	DESCRIPTION of System	HARDWARE							
		SOFTWARE							

goals. After this, small groups were formed and the questions (classified according to information classes and respondent categories) were discussed. At this same meeting arrangements for on-site visitation dates and self-selection of interviewing teams took place. Panelists had an opportunity to meet interviewing team members. An overall understanding of the complexity of the evaluation task was gained. The diversity of opinion regarding wording of questions and appropriateness of questions was helpful in developing an instrument which would be readily understood.

The attempt to classify questions by information class and respondent category was, however, frustrating. Questions which made good sense in their first location in the variables list, suffered by being lifted out of context and shuffled together with other questions from other aspects of the original variables list. This made the task of group review and revision of questions difficult. Nevertheless, an appreciation of the breadth of the evaluation task did emerge from the conference, and it was partly because of the organization of questions for review that this sense of complexity and importance was evident.

6. FIELD tryout version. Using the notes and suggestions of panel members, the FIELD was reworked into a "tryout" form. It was now ready to be carried to the various university campuses by the AIR teams.

The refined FIELD was broken down into seven respondent categories as follows:

- STUDENT (User of MM System)
- STUDENT (At Large)
- TEACHER (User of MM System)

- FACULTY (At Large)
- TECHNICIAN
- SYSTEMS DIRECTOR
- INSTITUTIONAL RESEARCHER

The questions in each respondent category were then arranged on the page with introductory statements defining the reasoning or information need which was being served by the particular question. This aided the system evaluator to interpret questions and demonstrate utility in evaluating the effectiveness of the particular system.

A copy of the FIELD, as revised in the FIELD tryout, is included as Appendix A.

7. FIELD application.

a. Visitation strategy. After the systems and the institutions to be studied were selected and the FIELD had been prepared, the actual on-site visitations began.

The following Table indicated the institutions visited and the faculty members contacted:

Institution and Faculty Contact	Systems Studied	AIR staff interviewers
Florida Atlantic Meyer	CCTV Language Lab.	Dr. H. P. Van Cott Mr. Charles Williams
Syracuse University Fishell	Multi-Media Language Lab.	Dr. George Johnson Mr. John Connolly
Harvard University Stolurow	CAI Laboratory	Dr. Ronald Carver Mr. C. Faegre
	Language Lab.	Mr. Charles Williams
Wayne State University Childs	Micro-teaching	Mr. Charles Williams Mr. Charles Darby
Wayne State University Childs	Language Lab. Dial-Access	Mr. C. Faegre Dr. Raymond Muller Mr. Charles Darby

During the visitation schedule, an orientation, training and familiarization session enabled AIR staff members to have mock interviews with Dr. Van Cott and Mr. Williams, both of whom had earlier conducted interviews at Florida Atlantic University.

As further visits were conducted, additional efforts were made to familiarize AIR staff members with team experiences, so that orientation and training were continuous throughout the period of administration. Members of the teams shared their concerns about the document and instruments and kept a running modification of the instrument in mind as they conducted the interviews.

At each institution the AIR staff personnel met their university contact and received a brief tour of the system facility that they were to study. They then requested that interviews be arranged with faculty members using the system as well as with some who were not using the system. Interviews were set up with such system personnel as the Director and his technicians. Arrangements were also made for group administration of the student questionnaire to classes of students who had used the system.

Some student non-users were interviewed individually by approaching them in classroom buildings and asking for an interview regarding their experience with media systems.

b. Time required for administration. The following is a Table of questionnaires which were administered. They were titled according to the respondent being interviewed. The average length of time in minutes required to administer the questionnaire is given in the table:

Questionnaire	Time in Minutes
Student User	25
Student Non-User	15
Teacher User	60
Teacher Non-User	15
System Technician	120
System Director	180
Institutional Researcher	60

c. Administration. Application of the FIELD at the universities followed a fairly consistent pattern. For most interviews two AIR staff members worked with one respondent. One AIR staff member was responsible for conducting the interview and recording the responses of the interviewee on the questionnaire forms. The second AIR staff member observed the interaction between interviewer and interviewee. Questions which caused difficulty were noted. Ideas for revision of questions were entered into a Master copy of the FIELD. Where additional explanations were required they were noted. Other running commentary and impressions were recorded by the observer.

d. Departures. Several departures from the original plan for administering the FIELD were taken. For example, since the time consumed in administering the FIELD was greater than anticipated, most Student Users were asked to respond to the FIELD in classroom groups rather than as individuals.

The particularly long questionnaires (such as the Teacher User, System Technician and Systems Director) were usually conducted in two or more sittings, rather than all at one sitting. In some cases, it was necessary to administer the same questionnaire in parts to two individuals in the same respondent category. For example, the first half of one technician questionnaire was administered during one interview session. The second half of the same technician questionnaire was administered to a different technician involved with the same system. In other situations where there was only a short time to finish a questionnaire, some items, about which a great deal of information had been previously gathered, were skipped. This allowed additional responses to vital questions to be secured.

II. FIELD STUDY

B. Findings

1. Findings concerning the instrument. Based on the findings from the FIELD, specifications have been developed for a revised FIELD which will be presented and discussed in Section II, D of this final report.

a. Definition. All AIR personnel who administered the FIELD mentioned the problem of definition. Examples of problem terms are: "media," "system," "educational activities," "functional specifications," and "technical specifications," among others. Another aspect of the problem related to context, in which the responding individual must place himself to answer the questions. For example, it was not always clear in the questionnaire whether the individual respondent should base his answer on his total college experience in answering the questions or only on his experience with mediated courses. If he were to answer questions in terms of mediated courses, should he report this experience with all media systems or just the one under study? Another very critical definition of this type related to the meaning of "system user." In some cases, students who were users of the system were asked to answer non-user questionnaire because the initial series of questions did not determine whether the individual was a "system user." In addition, several non-users had had previous experience with the media system but at the time of the questionnaire administration were not using it or had no experience with the particular media system being analyzed.

Two other definitional problems are: the definition of system or class under which the subject system falls, and of the particular system as provided in a functional relationship diagram. The

FIELD questionnaire provides a panel which shows a diagram of the systems under study. In some instances, individuals were unable to determine whether the particular system with which they had experience was represented.

System personnel were asked to sketch the functional interaction of their media system. The sketches ranged from representation of the interaction between hardware and the interaction between course material and the student.

b. System specificity. Prior to entering the trial phase, all questions in the FIELD were conceived to be applicable to all types of systems. Administration of the FIELD proved this to be a difficult (although not unworkable) concept. Numerous questions apply only to specific types of systems or must be asked in a system-specific form. Later editions of the FIELD should include both questions which are generally applicable to all systems and some sets of questions which are geared to specific systems.

c. Teacher inclusion. As indicated, respondents were requested to draw a diagram of the media system. In some of these the teacher was shown as part of the media system, while in others the teacher was not shown. This variability may have caused a difference in students' responses regarding the system, i.e., if students considered the teacher as part of the system, their reactions were to the teacher rather than to the media itself. However, it is realistic to consider the teacher as part of the system, since media systems seldom function in isolation without "course framework" or assignments, etc. The teacher functions as an integral part of the system using the media to accomplish his instructional goals.

d. Duplication. A number of questions in the FIELD questionnaire have been duplicated by design. The same question was asked of respondents in two different categories as a means of obtaining comparable data on two populations. For example, the same question regarding the effectiveness and efficiency of the hardware is asked of both the Systems Director and faculty members using the system. It is obviously important to determine whether system personnel and system users share the same view regarding effectiveness. These types of questions attempt to measure the effectiveness of media systems by sampling attitudes of those involved with them rather than by collecting factual information. These attitudes must be verified by sampling the attitudes of respondents who potentially may hold opposing views about media systems.

e. Attendance constraints. Faculty users were asked to indicate whether the use of the media system is voluntary or compulsory for students. Responses to this question indicate that attendance constraints cannot be dichotomized in an all-or-nothing manner. In most cases, attendance is neither voluntary nor compulsory, but in fact, falls on a continuum between those two extremes. In any one course, students' use of the media for some portions of the course may be voluntary and for other portions of a course may be compulsory. In another situation, the instructor does not require his students to visit the laboratory and does not take attendance, yet does present material through the media system which is not covered in his lecture and which he expects the student to learn in order to complete course requirements. Such a situation may cause students to perceive attendance as compulsory while the instructor considers it to be voluntary.

Some students may be so concerned that they will miss part of the course material that they consider the media laboratory to be compulsory, at least for themselves.

One other factor clouds the issue of attendance. When media are used as part of a classroom presentation, attendance constraints are those placed on classroom attendance. An accurate measurement of the degree to which attendance is compulsory or voluntary must be obtained because the interpretation of the data relative to system utilization is obviously quite different under the two conditions.

f. Choice. Students were asked in the FIELD questionnaire whether they have the option to choose media taught courses over conventionally taught courses. Experience indicated that many students had no way of predicting whether a course was taught using media or conventional means. The catalogs of classes which students used to select their courses gave no such indication. Questions concerning the students selection of media vs. conventionally taught courses may have to be asked in terms of a hypothetical situation only.

g. Development vs. operational. Systems studied during the FIELD trials tended to fall in one of two categories. Some went through developmental stages and later became operational; others remained experimental and were used primarily for research. The existence of these variations created additional difficulties in evaluation of the FIELD.

h. Costs. All cost information was very difficult to obtain. Most questionnaire respondents had not performed a careful cost-analysis on the media system for which they were responsible. Those who had, did not approach the problem in the same manner as did the FIELD. Cost information is essential to evaluation of system effectiveness. The information to be gathered must be carefully selected on the basis of its significance for measuring cost effectiveness.

i. Question format. Many respondents had difficulty in answering forced-choice questions, i.e., those which give only "Yes-No" choices or some other limited number of choices.

j. Systems approach. While the FIELD asked questions concerning media system development as though collegiate level planning were a systematic and orderly activity, none of the respondents at the institutions visited had experienced opportunities to systematically develop their media systems.

k. Measuring system effectiveness. Several respondents to the FIELD questionnaire were concerned with measuring system effectiveness. They felt that the present form of the FIELD did not investigate the issue sufficiently. One respondent suggested that questions be asked to determine if use of media tends to promote or stifle favorable attitudes toward the subject being taught.

Another respondent suggested that system personnel and faculty users be permitted to indicate present and future ways in which to measure system effectiveness. Others mentioned the importance of determining, through the questionnaire, whether student learning is improved through the use of mediated instruction.

l. New areas for study. Other areas suggested by respondents involved specifying the kinds of learning each type of media system is used for in practice and with what degree of success. (See Part I, Sec. C.)

Several System Directors and faculty members indicated that an important factor in planning and developing a system is the amount of administrative support received. Related to this is the issue of funds. One individual respondent felt that it was necessary to distinguish between size and criticality of funds. He indicated that the most common problem was a lack of follow-on funding for staff and software development. He noted that it is comparatively easy to obtain funds for system hardware but difficult to obtain funds for staff. It was also mentioned that the FIELD questionnaire might be adapted to a case study approach or profile describing how an individual faculty member decided to instruct using a media system.

m. Acceptance of FIELD. Most interviewees felt that the probing questions asked by the FIELD should stimulate thinking about media system evaluation.

2. Findings concerning the institutions and media systems. Many of the issues discussed in this section have been commented upon in the previous section in terms of the FIELD instrument. The following discussion centers on the influence of these issues on the institutions and media systems studied.

a. Teacher inclusion. The influence of the instructor on the effect of the media system is one such issue. The teacher, in most instances, is considered to be part of the system, since he normally produces some or all of the curriculum materials for the system and sometimes participates as a live user of the media system. The attitude of students toward an instructor may have great influence on their attitudes towards the media system of which the teacher is a part.

In some systems, the teacher is a component of the system during its actual operation. Including the teacher as part of the system to be evaluated adds a new dimension to both the capabilities of the system and the problems faced when designing it. Therefore, media system designers should take into account the capabilities of the faculty who are potential users and participants in the media system.

To specify the interaction of equipment in a media system may be easy, but specifying effective interaction of teacher, equipment, and student in course material presentation is far more difficult.

b. Development vs. operational stages. When educational decision-makers were evaluating or planning media systems, they considered the developmental stages prior to the operational stages. Even during the operational stage development of increased equipment capacity and software library continued. Because the nature of media systems changes as they pass through the stages of development to become mature operational components of the higher educational armamentarium, such systems have to be evaluated differently. A system in an early stage of development cannot be expected to be cost effective, whereas a fairly mature system may be measured by a rigid cost accounting paradigm.

In addition, when planning a system, the designer must realize the differing factors of cost during the various stages. For example, hardware costs may be the most expensive at first; while later, software development costs may predominate. Also, a system may move from an early isolated configuration into a more sophisticated system interconnected with other media systems on the individual university campus or other systems at other educational institutions.

c. Time-savings. Users of media systems generally indicated that they did not save time through usage. Preparation of materials took much longer than for conventional classroom lecture presentation.

However, most system users felt that after course materials had been fully developed and packaged for presentation, time was being saved. Therefore, in the early use of a media system, system planners should be prepared for higher faculty costs and less efficient use of manpower. Over the long run, the opposite prevails. This may not be true of media systems which require continuous additional time on the part of instructors, but a resultant increase in quality of instruction will offset the time increases.

d. Faculty compensation. Respondents to the FIELD questionnaire repeatedly emphasized the importance of developing good software for a media system. At the same time, software is the most difficult commodity to obtain. In most institutions, faculty members are responsible for software development. Since increased time is required for this, some form of released time or use of special faculty staff members is recommended to encourage participation in software preparation.

Although released time was the most frequently mentioned compensation, other benefits might include monetary remuneration or special positions, privileges and promotion for those faculty members developing software for use in media systems.

e. Copyright issue. Several faculty members also voiced concern regarding their copyright to software and course materials developed for use in media systems. Do the materials which have been developed in fact belong to the faculty members or to the university? In addition, several faculty users felt that if the materials an instructor had developed were used at another institution, he should be paid royalties for the materials.

A distinction must be made between state and privately controlled and supported institutions of higher education. It is most common for the faculty member of the first type to give up all rights to materials he had developed, unless he can demonstrate that the materials were prepared on his own time. In private institutions, this rule is not so rigidly observed.

In some cases, instructors in state supported schools feared that completion of a set of software materials for a course would have the unwanted effect of getting a second course assigned to them once they had the first course "in the can." They feel they might "work themselves out of a job."

Several persons operating media programs expressed concern about rights to materials and the effect which conflicting rules concerning copyrights can have on faculty creativity. System designers should build software development incentives into the program rather than fight the apathy created by the situations in which no right or interest resides in the writer or developer of software.

f. Systems approach and behavioral objectives. The FIELD questionnaire attempted to study the effect of a process (System Planning) which is usually assumed to be a systematic one. In most cases, the system was not planned systematically.

As indicated, the FIELD may serve to stimulate those responsible for designing media systems to take such an approach. Nearly all respondents recognized the need for systematic development but were also painfully aware of the difficulty involved. One important aspect of the development of a media system is the defining of the output from the media system, that is, the learning that will take place as a result of the use of the media system. It is at once the most important area of planning the most neglected area of planning and the most difficult activity to accomplish.

Faculty users and system personnel frequently averred that "educators know very little about the outcomes expected from teaching." They are not sure what behavior they want students to display as a result of teaching. To glibly say that one should identify the outcomes of a course in behavioral terms grossly underestimates the problems involved. A considerable length of time and large amounts of money to empirically define those behaviors which students should display at the end of a presentation of a course will be required.

g. Funding. In tracing the history of media systems, it frequently appeared that the unexpected or unearned availability of funds was a prime mover in initiating action for the development of the system. Only rarely was an orderly procedure followed in the development.

h. Selection vs. evaluation. There was some evidence to indicate that the decision making process involved in selecting a new media system from a group of alternatives may be different from that involved in evaluating an existing system. For this readon, FIELD data may require differential interpretation.

i. Familiarization. The job of the educational decision maker and system planner seemed to include one of publicizing existence and the potential of the media system on the university campus. Nearly all faculty members and system personnel pointed to increased familiarity with a system as the best way to increase its use. Also, nearly all faculty members who indicated they were not using the media system did not know of its existence. To receive the ultimate benefits from the media system, system planners must be prepared to proselytize and train the faculty in the use of the system.

j. Administration. The system planner must also take into account requirements for administration. In some instances, non-academic personnel administer the system, in others, academic personnel were responsible. It seemed that there may be an optimum mix of both academic and non-academic personnel for planning and operating a media system. In any event, sufficient administrative support and back-up is required, particularly in the early development to assure full support by those who are most influential in the area of staffing and funding.

k. Achievement. Although the education decision maker may gather a wealth of evidence to indicate that both students and faculty members like a media system and tend to use it, officials responsible for funding such systems may still require evidence that the media system does in fact promote more (and possibly more rapid) learning than conventional lecture methods.

Most institutions of higher education resist the idea of evaluating instruction. It is far more common to evaluate student achievement, placing the responsibility for educational progress on him. Efforts to measure instructional effectiveness are resisted because they threaten to put the onus for low achievement on instructional personnel and methodologies.

This single problem (the finding of adequate measures of effect) was probably the most difficult aspect of the FIELD development and try-out. Only one institution (Wayne State University) was running a significant number of students (approximately 200) in a discrete system (a political science course being taught with the partial use of a Dial access lab) which had comparable non-mediated instruction going on at the same time with similar groups (conventional political science instruction through lecture and discussion). And even in this situation, there were inadequacies in the pre-test and post-test materials available for use with both groups.

It may be, as is suggested later, that the present state-of-the-art will require use of "credit hours" and "grade points" as rudimentary measures of achievement and output effects.

3. Numerical data findings. Data related to certain key issues such as student use, faculty use, software cost, hardware cost, media vs. conventional instruction preferences, etc., will be reported in this section. These data, although tabulated, have not been prepared in final form. Data for this section are based on the FIELD administration at four institutions of higher education and represent nine media systems.

Collection of data on nine media systems in four universities was designed as a trial of the FIELD. It was not intended to gather evaluative data so much as to test the feasibility of gathering data about media systems. As a by-product of testing the FIELD instrument at four institutions, a great deal of data were collected. Significant samples of this material are reported in this section. The data aggregations reported here are based on only a small number of observations. They in no way represent a sample of observations of media systems in higher education institutions upon which generalizations can be drawn.

These data, however, were carefully and objectively drawn from the four institutions visited during the FIELD tryout. Therefore, they do provide some information about media systems at those institutions. Information reported is that which was particularly significant or interesting and about which data could easily be tabulated from the trial FIELD. Findings based on this FIELD data are discussed in the following paragraphs.

a. Demand. To measure effectiveness, it is necessary to determine the degree of utilization. Students were asked to estimate the number of hours beyond the scheduled class hours of system use they used the media system. The question was phrased: "How much time do you spend using media beyond the scheduled class hours per week?" The phrasing was unfortunate in that it requested estimates of extra-class utilization only. Future questions will request estimates of both in class and out of class use.

Of the 56 students who responded to this question, 26 indicated they they did not use the media beyond the classroom at all. The median use beyond scheduled classroom time was 45 minutes/week and the mean use of the system was just in excess of one hour/week. Students' responses ranged from 0 hours of use to a high of 6 hours of use on a weekly basis.

b. Time saving: students. Another measure of the effectiveness of a media system from the standpoint of a student is whether time is saved. "Do you feel that time is saved when using an instructional system (compared to conventional methods of instruction)?" was asked of the students. Comparison was made to conventional methods of instruction in order to give the student a frame of reference on which to base his estimate.

Of the students answering this question, 76.8 percent felt they had saved time.

c. Course selection. The respondent was asked, "If the same course were being offered two ways (one using conventional methods and one using mediated methods) which would you choose, all other things being equal?" Students indicated that actually they had no knowledge of the instructional mode of a course as described in the schedule of classes so that this question and the one that follows were asked about hypothetical situations.

A high percentage (81.4%) indicated that they would choose mediated instruction over conventional instruction.

d. Preference. The next question was designed to determine if the student would choose a course knowing that it was taught using a mediated system approach.

Students were asked, "Would you choose another course taught by the mediated instructional system approach?"

A larger percentage (86%) chose mediated instruction in this case than in the previous question. The slightly larger percentage of student answering favorably toward mediated instruction is worthy of comment. It may be that there are students who would not reject a course simply because it employed a mediated instructional system. However, these same students would reject the media approach if they could take the same course using a conventional instruction system. In any event, there was a favorable attitude toward mediated instruction.

e. Student load. Faculty members were asked to report on their use of the media system under study. One of the first questions asked them dealt with the student load they were handling with the media system. Faculty members were asked three questions leading up to an estimate of the gross number of student hours per week that the media system was being used by the individual faculty member in his courses. Questions were as follows:

(1) How many students do you have participating in courses using this teaching media system?

(2) How many hours per week (on the average) do they use the system?

(3) What is the gross number of students per week calculated from above?

Estimates of the gross number of student hours per week ranged from a low of 12 student hours per week with one language laboratory to a high of 6,175 student hours per week with a computer aided instruction system. This tremendous variability in the small number of observations reported upon makes summary statistics rather questionable. Therefore, only the actual observations are shown in the following chart.

CHART J - INSTRUCTORS' CALCULATIONS OF MEDIA SYSTEM USE

Media System	Gross No. of Student Hours/Week
ETV	300
CAI	6,175
DAIRS	35
DAIRS	112
DAIRS	360
DAIRS	42
ETV	400
MM	180
MM	375
MM	42
LL	12
LL	1,000
LL	250
LL	30
LL	323

f. Time saving: faculty. Student generally viewed the use of media systems as a time-saver. Faculty members were asked their views on this subject.

The question was phrased: "With respect to time-use when teaching with mediated instructional systems, do you find that you use more time overall or do you save time overall?"

Unlike students, faculty members indicated they they used more time in courses where they were utilizing mediated instruction than in those in which they were utilizing conventional instruction. Of the faculty members responding, 87.5 percent indicated they they used more time with mediated instruction than with conventional instruction.

They reported that a good deal of time was spent preparing software materials for their media taught courses. Once the software was developed, the majority of them believed that time would be saved. The additional time required to prepare software was taken from the faculty members' own free time rather than time planned for other job activities.

g. Training: faculty. One essential element of a successful media system is the training of participants. To determine whether faculty members were satisfied with the training which they had received, they were asked this question: "Do you feel your training has been adequate to effectively handle this instructional system?" Of those responding, only 40 percent felt the training had been adequate. Training received by participating faculty members had not been of a formal nature. Rather, it consisted of assistance from system personnel, faculty members, or self acquired knowledge.

h. Faculty satisfaction. Still another measure of the effectiveness of a media system is the level of satisfaction expressed by faculty members.

Faculty users were asked this question: "From your standpoint as an instructor, are you satisfied with the present use of the multi-media system?" Only 33.3 percent so indicated. This percentage closely parallels the reported satisfaction with the training received.

This evident dissatisfaction may be the result of faculty members' frustration in developing software materials, an activity for which they had little training and one which frequently required a great deal of their time. In addition, all faculty members mentioned their dissatisfaction with lack of release time for developing media software.

i. Level of use. It is important to know whether the use of a media system is increasing or decreasing, and if so, at what rate.

Faculty users and media system directors were asked the following question: "In your view, is the use of the system increasing, stabilized, or decreasing at this point in the life of the teaching system?" They then were provided with four choices - Steeply Increasing, Slowly Increasing, Stabilized, or Decreasing Utilization.

Of the respondents who answered this question, all but five percent indicated that the system was increasing in use. The five percent indicated that the use of the system had stabilized. Forty (40) percent of the respondents indicated that the system was steeply increasing. Fifty-five (55) percent indicated that the use of the system was slowly increasing. A breakdown of system type is shown in the chart below:

CHART K - LEVEL OF SYSTEM USE

System Type	Steeply Increasing	Slowly Increasing	Stabilized Use
Multi-media	40%	60%	-
Dial-Access	50%	50%	-
CAI	100%	-	-
Language Lab	16%	68%	16%
Educ. TV	-	100%	-

j. Costs. Since it is an essential element in effectiveness evaluation, a series of questions were asked attempting to estimate the cost of hardware and software used in the system. Costs were estimated for two types of software: (1) software published and commercially available and (2) that software which was developed locally on the campus.

These questions dealt with cost of hardware and components. Media directors were asked this question: "What is your estimate in dollars of the cost per hour of student use of this system hardware?" Briefly, respondents were asked to estimate cost of installation of the equipment, amortize this original cost over estimated life, add annual cost for operating and maintaining the equipment, and divide this sum by the estimated hours of student use per year. As a formula it looked like this:

$$\text{Hardware Costs} = \frac{\text{Amortized Original Cost} + \text{Annual Operating Costs} + \text{Annual Maintenance Cost}}{\text{Student hours of use per year}}$$

Estimating the system component cost was quite difficult and most system directors found it almost impossible to provide answers to the questions. Only two directors gave realistic estimates of the hardware cost. One was for an operational Dial-Access system, the other for an experimental CAI system.

The Dial-Access system *hardware* was estimated to cost approximately 30 cents per student hour of use and the CAI system *hardware* approximately $10 per student hour of use.

k. *Purchased software.* Software, whether developed locally or commercially, can be a very significant cost in the use of media system.

Media directors and faculty members were asked this question: "Take into consideration the cost of published materials, texts, library resources which are allocated for this course (assigned and research) and other information resources which are purchased from outside sources. Attempt to assign a cost per student hour for this purchased material. Consider life expectancy of library acquisitions, text material and other factors of cost per student hour of use. Compute the cost per hour of educational activity derived from published materials, that is, the gross cost divided by student time spent with the materials. This equals a cost per student hour of use." Represented in formula it appeared this way:

$$\begin{array}{l}\text{Purchased}\\ \text{Software}\\ \text{Cost}\end{array} = \frac{\text{Cost of Materials Published}}{\text{Student hours of use during life expectancy}}$$

The faculty and media system directors found it quite difficult to work through this computation of software costs. However, a number of estimates were made which appear in the chart below.

CHART L - COST OF PUBLISHED SOFTWARE/STUDENT HOUR OF USE

System Type	Software Cost Estimate				
Dial-Access Laboratory	$.30,	.33,	.20,	.05,	.10
Multi-Media Classroom	$.32,	.08			
Language Laboratory	$.15				

There is relatively little variation in the estimate of the cost of published materials, the range being from 33 cents/hour of use to 5 cents/hour of use. It will be interesting to look into the reason for this relatively limited variability. Possibly it may be due to the lack of variety in the types of materials which are commercially available. One caution must be indicated here. There is no estimate concerning available CAI software. It is suspected that this form of software will be leased. Were it for sale it would probably be more expensive than any of the software materials for which cost estimates were made.

1. Home-made software. The next area of cost was that of locally developed software materials and an estimate of the cost per student hour of use was made. Faculty members and media directors were asked to make an estimate of the cost of the materials and time required to produce software materials locally.

They were asked this question: "Please perform a similar computation for locally prepared materials. Here again, efforts should be devoted to life expectancy of on-campus prepared materials. Compute the cost of materials; add to this the staff time (faculty and system personnel hours multiplied by the hourly salary of each contributor). Divide this sum by the number of student hours of use for the software material. This will equal a cost per student hour of use."

In terms of a formula the computation was as follows:

$$\frac{\text{Material Cost} + \text{Staff Time} \times \text{Hourly Salaries}}{\text{Student hours of use during life expectancy}}$$

Difficulty was also experienced in making an estimate of the cost of locally prepared software. The estimates made appear below.

CHART M - COST OF LOCALLY PREPARED SOFTWARE/ STUDENT HOUR OF USE

System Type	Local Software Cost Estimate	
Dial-Access Laboratory	.50	.31
Multi-Media Classroom	1.22	1.10
Language Laboratory	.40	

Here we find considerably more variation in the cost estimates than with published software. However, in addition, by comparing the locally developed software cost estimates with the published software estimates, we see that there is a tendency for the locally developed materials to cost more than the commercially available materials. For example, it was reported that multi-media classroom materials, which were commercially available, cost approximately 32 cents per student hour of use, whereas the locally developed materials cost $1.22. The reasons behind this are worthy of investigation with the NEW FIELD.

m. Gross, net and percentage of use. It was important to determine the percentage of utilization that systems are receiving. Several questions were asked of media directors: "Estimate actual net number of hours of student use per annum for this system (compute average positions used X hours used per week X weeks used per year)." "Indicate the gross number of hours the system is available for use during the year (student positions available X hours scheduled per week X weeks scheduled per year)."

From answers to these two questions, an estimate was made of the percentage of utilization of the system by dividing the total number of hours that the system was available for use into the total number of hours the system was actually used. Data gathered from these two questions appear in the chart below.

CHART N - PERCENTAGE OF UTILIZATION

System Type	No. of Hours Available (Gross) per annum	No. of Hours Actual (net) per annum	Percentage of Utilization
Language Lab.	186, 480	113, 000	66.0
Language Lab.	120, 744	91, 350	75.7
Language Lab.	237, 864	237, 864	100.0
Multi-Media	172, 832	137, 280	79.4
Dial-Access	105, 300	28, 000	26.6

Clearly, all the systems were being well used. Even the apparently low 26 percent reported at the Dial-Access Laboratory is a very respectable figure considering the fact that this laboratory was on a demand basis (open 7-11, walk in anytime) at a commuter-type university (peak loads when students are on campus, radical fall-off during slack hours).

C. Discussion

In a previous section entitled Findings, the experience in administering the FIELD was reviewed. The following discussion describes the changes which should be made in the present FIELD based on this experience.

1. Definition. Several terms such as media, system, and functional specifications should be clearly defined at the time they are introduced in the NEW FIELD. Respondents should be asked to answer questions in terms of their experience with the media system under study unless otherwise specified. This will give the respondent a frame of reference which was lacking in the earlier edition of the FIELD.

As indicated earlier, sketches of systems varied from those which showed interactions of equipment to those which showed interaction of students with equipment. After drawing the sketch of the media system, a revised FIELD item should request that the respondent indicate what type of interaction is shown on this sketch.

The FIELD in its tryout form asks questions about media systems in general wihtout regard to specific types of media systems. It is obvious from administering the FIELD that such an approach is not feasible. Each item on the FIELD has been identified as it applies to each system type.

2. Teacher inclusion. The FIELD in its revised version should consider the issue of the teacher as a part of a media system. Those areas where we are interested in the reaction to the media system (excluding the teacher) should specify that the teacher is not to be considered part of the system.

This inclusion of the teacher as part of the system configuration is something that has been overlooked in designing systems by many educators.

3. Developmental vs. operational. Questions should be added to the NEW FIELD to determine if respondents view the particular system under study as one in a developmental stage or an operational stage. In addition, respondents might be asked to specify whether the system design has changed during the developmental stages of system growth and to provide a description of how the system has evolved. Where appropriate, results of the FIELD study on a larger sample of institutions should be interpreted in terms of the developmental and operational stages.

4. System choice. Information concerning choice of media system courses in preference to conventionally taught courses must be gathered in part from hypothetical questions. An example might be: "Would you choose a media system taught course over a conventionally taught course, all other things being equal?" This approach is necessary, because students do not know, prior to entering the course, whether it is taught by conventional means or through the use of a media system. A by-product of the study may be a recommendation to indicate in class catalogues which media are used in which courses.

5. Attendance constraints. The question regarding attendance constraints needs improvement. It should be phrased so as to capture the subtle differences between the instructor's and student's perception of compulsory or voluntary attendance. The revised question should determine where, on the continum of attendance constraints, each media system falls.

Utilization data for each system should be interpreted differently for those courses which are voluntary and those courses which are compulsory.

6. Costs. Questions about costs will have to be further refined to include very closely defined elements or cost factors which are to be included in the cost/effect ratios in the NEW FIELD.

A detailed cost estimating procedure should be worked out permitting differential assessment of cost for each class of system. Subsets of questions and supporting explanatory paragraphs must be prepared to assist respondents in estimating and calculating all of the various costs which are involved in the purchase and use of a media system. Without such detailed methods for "forcing" the cost analysis, the NEW FIELD administration will fail to meet its evaluation goals. (It should be pointed out that the root word in "evaluation" is "value.")

7. Open-ended questions. Open-ended questions may be added to permit free discussion of likes and dislikes relative to the media system. Numerous respondents in the FIELD trial found it difficult to answer some questions either "yes" or "no." A question might be revised to read: "Are you generally happy with the performance of the hardware in this media system?" Space for comments after the yes/no answer should be provided.

8. Duplication. Duplicate questions should be removed unless the duplication serves the purpose of checking the reliability of responses.

9. FIELD structure. From the FIELD trial it is obvious that the questionnaire should be structured according to data requirements (see page 108) rather than by respondent category. This revised structure is discussed more fully in the next section.

D. Specifications for a NEW FIELD

The respondent oriented version of the FIELD instrument that was used in the tryout phase provided a vehicle for examination of a great many variables. It was fact-oriented and attempted to get at "ponderables." It avoided rating scales and estimates of attitude. A revised FIELD instrument should permit examination of a smaller number of variables and determination of specific numerical values for each of the variables.

In the following discussion a "NEW FIELD" is described which can be expected to yield numerical evaluative ratios. These then are the specifications for a revised evaluation instrument.

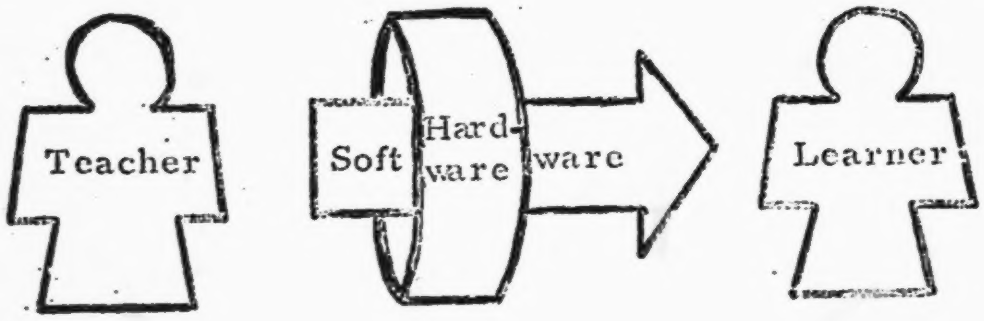
1. Structure of revised FIELD. The present set of questions will be rearranged and organized to yield answers to four basic questions. These basic questions, which can be answered with respect to any class of system, are:

- What does it cost?
- How much is it being used?
- Do users accept it as a means on instruction?
- Do users learn through the use of it?

Each of these basic questions can be expanded into an ordered sequence of questions which will yield a single class of facts:

- Costs
- Utilization level
- Acceptance rate
- Achievement units

2. System model. These four questions (cost, utilization, acceptance, and achievement) can be answered in the context of the four basic System Model components: Teacher, Software, Hardware, and Learner. These components can be arranged as follows:



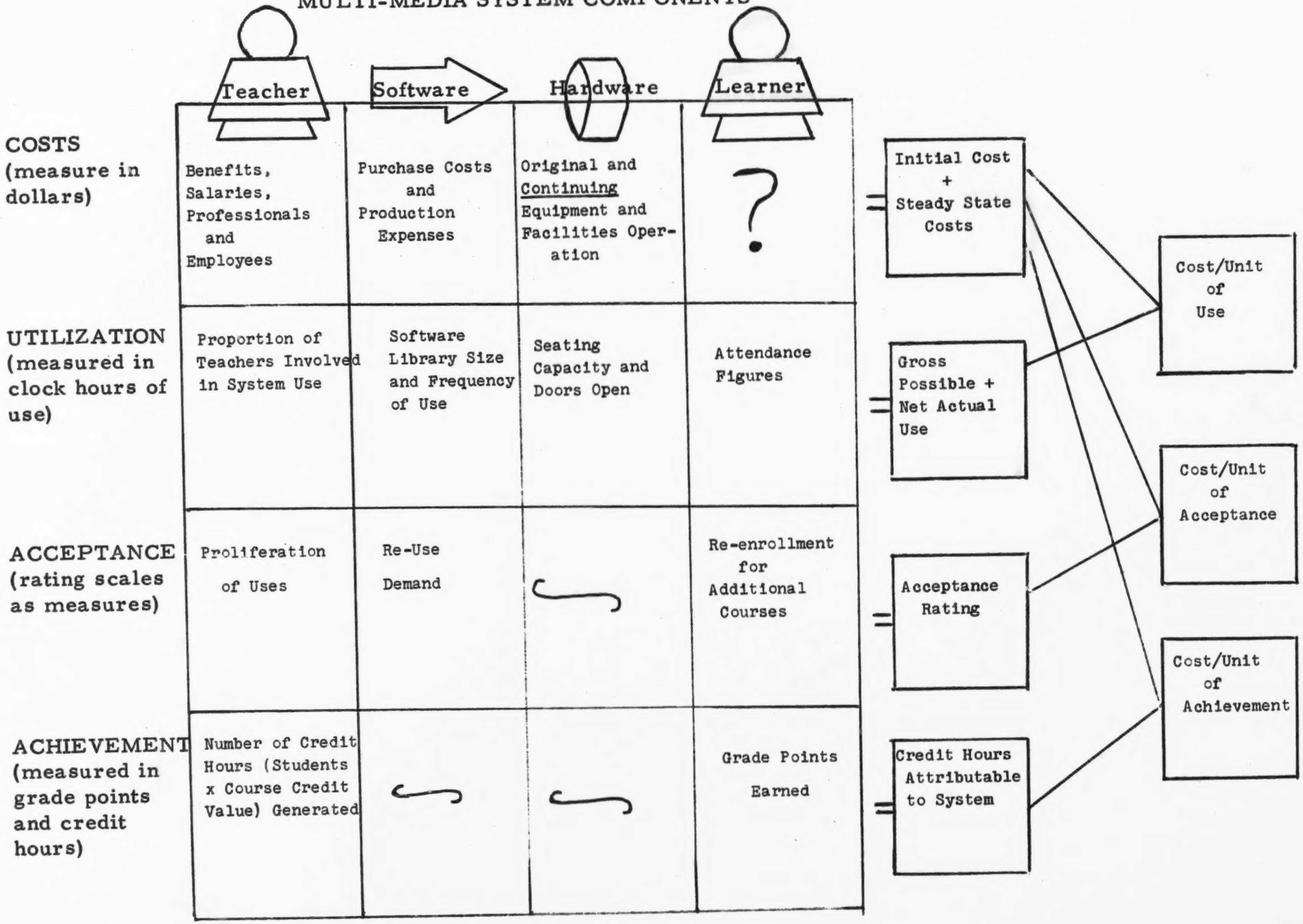
This organization of questions will yield information which can be represented in a four-by-four chart. Such a chart is shown on the next page.

Each of the 16 cells of the chart represents one class of information about a specific component of a system. For example, one cell of the chart indicates that cost data can be collected in the new FIELD relative to expenses incurred through use of faculty in the system. Some cells of the chart have been left blank because that class of information about that system component is inappropriate, redundant or less germane to the purpose of the data collection.

3. Classes of questions. The first class of questions (dealing with costs) will produce information about a larger category of data concerned with the antecedent conditions existing in each of the system components. The other three classes deal with information about criterion measures of system effectiveness. The data collected about each system component provide informa-

CHART O - INFORMATION CLASSES

MULTI-MEDIA SYSTEM COMPONENTS



	Teacher	Software	Hardware	Learner
COSTS (measure in dollars)	Benefits, Salaries, Professionals and Employees	Purchase Costs and Production Expenses	Original and Continuing Equipment and Facilities Operation	?
UTILIZATION (measured in clock hours of use)	Proportion of Teachers Involved in System Use	Software Library Size and Frequency of Use	Seating Capacity and Doors Open	Attendance Figures
ACCEPTANCE (rating scales as measures)	Proliferation of Uses	Re-Use Demand	~	Re-enrollment for Additional Courses
ACHIEVEMENT (measured in grade points and credit hours)	Number of Credit Hours (Students x Course Credit Value) Generated	~	~	Grade Points Earned

=
Initial Cost + Steady State Costs
=
Gross Possible + Net Actual Use
=
Acceptance Rating
=
Credit Hours Attributable to System
Cost/Unit of Use
Cost/Unit of Acceptance
Cost/Unit of Achievement

tion regarding the relationship between antecedent conditions and criterion measures. This relationship forms the basis of the evaluative strategy.

Relationships between cost as an antecedent condition and the criterion measures of system effectiveness (utilization, acceptance and achievement) will be reported in the form of ratios. Cost will be reported per unit of system effectiveness. The ratios to be computed are:

a. Cost per unit of use might be stated in dollars per student hour or cost per year of optimum use. The first of these would be calculated by summing cost of faculty, hardware and software, and dividing by the total student usage in hours. The ratio would appear as follows:

$$\frac{\text{Faculty Cost} + \text{Hardware Cost} + \text{Software Cost}}{\begin{array}{c}\text{Number of Students}\\ \text{Using System}\end{array} \times \begin{array}{c}\text{Average Hours of}\\ \text{Use per Student}\end{array}}$$

b. Cost per unit of acceptance might be stated in dollars per percentage point of faculty members using the system or students indicating they would enroll in another media-taught course. For example, the first can be shown as the ratio:

$$\frac{\text{Faculty Cost} + \text{Hardware Cost} + \text{Software Cost}}{\text{Percentage of Acceptance}}$$

c. Cost per unit of achievement might be stated in dollars per credit hour or grade point. The first of these can be shown as the ratio:

$$\frac{\text{Faculty Cost} + \text{Hardware Cost} + \text{Software Cost}}{\text{Credit Hours Achieved}}$$

These cost figures should be reported separately for each class of system. Because of the wide variations in cost from one system class to another, it is not meaningful to report a single cost figure for all media system classes.

Relationships between system component capabilities and system effectiveness will be reported in a variety of ways.

The capabilities of the system components will be analyzed as a discrete variable. For example, system personnel will be asked whether the system permits feedback to the student participant. Answers can be used to identify those systems that do permit feedback and those which do not.

Furthermore, faculty should be asked to indicate whether use of the system is increasing or decreasing. Answers can then be used to identify those classes of systems for which use is increasing and those for which use is decreasing.

Dichotomous variables (like "presence/absences of feedback" and "increase/decrease in use") can be placed in a two-by-two contingency table and analyzed using a chi-square statistic. Results of such an analysis might indicate that a significantly larger number of those systems which permit feedback are increasing in use than those which do not permit feedback. These types of data will permit statistical analysis only where data can be treated across systems. Any item of data such as quality of visual image, which is system specific will not permit statistical analysis because of the smallness of sample size. Statistical and narrative descriptions should be reported in these cases. Descriptive statistics should include means, modes, ranges, frequencies and percentages.

4. Classes of systems. Eight general types or clusters of systems should be studied. These are represented in the chart on the next page.

5. Products. The end products of the NEW FIELD would be:

Information based on the combined experience of a sample of 30 colleges and universities in the use of a large number of systems. This information will be collected in four categories:

- o Cost
- o Utilization
- o Acceptance
- o Achievement

as they relate to the system components:

- o Teacher
- o Software
- o Hardware
- o Learner

for each of eight classes of systems:

- o CAI
- o LL
- o DAIRS
- o MM
- o Audio-Tutorial
- o CCTV
- o Open-Circuit TV
- o VTR (used in micro-teaching applications)

CHART P - SYSTEM CLASSIFICATION

System Classes	Type of System within Classes
VERBAL, LINEAR PRINTED	C A I (Computer Assisted Instruction
VERBAL, LINEAR, AUDIO	L L (Language Laboratory)
	DAIRS (Dial-Access-Information Retrieval System)
MULTI-SENSORY, LOCAL	Fixed MM Classrooms
	Portable Audio-Tutorial Applications
MULTI-SENSORY, DISTRIBUTED	Closed-Circuit TV Systems
	Open-Circuit TV Systems
COMPLEX ACTIVITY DEVICES	VTR Micro-Teaching

6. Specifications (Forms). The NEW FIELD should consist of approximately 10 separate data collection forms. Each form should collect one class of information about media systems. The following is a list of the specific data collection forms:

- a. System Definer Form
- b. Media Program Profile
- c. Hardware and Facility Cost Estimation Procedure
- d. System Utilization Data Form
- e. System Use and Growth Forecast
- f. Software Cost Estimation Procedure (Appendix B)
- g. Personnel Cost Estimation Procedure
- h. System Benefits Measurement and Reporting Form
- i. Faculty Skills Inventory
- j. Large Sample Group Administration Instruments
- k. Case Study Report Form (System Profile)

The following breakdown describes the purpose of each data collection form which should be developed and gives samples of items appearing on each form together with a brief discussion of the data collection procedures to be used with each.

a. System Definer Form

(1) Purpose

Data collected on this form will provide a detailed description of each of the systems under study. From this description the system will be classified. Classification will permit like systems to be grouped by system type. Data can be aggregated and reported by system classification.

(2) Sample questions

(a) What forms of input to students are used in the most typical application of this system? What forms of input are possible with this system? (Forms of input include microfiche, work sheets, tape, film, slides, video tape, etc.)

(b) What response options are used with the most typical application of this system? What response options are possible but not typically used? (Response options include pushing buttons, turning pages, recorded utterances, hand written notes, etc.)

(3) Procedures

Other specific hardware characteristics (such as those found on pages 15 through 18 of the Technician Questionnaire of the Old FIELD instrument) will be collected on this form. Much of the data can be obtained by listing documents; other facts related to the definition of the system can be obtained from the system director and technicians.

b. Media Program Profile

(1) Purpose

As the previous section attempted to define the media system under study, this form strives to identify the characteristics of a larger factor, the media program of the institution.

(2) Sample questions

(a) Was this media system installed to solve an existing problem or satisfy an existing need?

(b) Have functional and technical specifications been written for the hardware and software components of of this system?

Other questions can be adapted from the "Evaluative Checklist," an instrument for self-evaluation of media programs by W. R. Fulton of the University of Oklahoma at Norman.

(3) Procedures

This information can be obtained from the system director and in part from the system technicians and student users. Much of it can be obtained in interviews and questionnaire formats.

c. Hardware and Facility Cost Estimation Procedure

(1) Purpose

This is one aspect of total system cost on which data can be gathered.

(2) Sample questions

(a) What is the replacement cost for each item of hardware in the present system?

(b) What is the estimated cost of the physical facility occupied by the system hardware (estimation procedure provided)?

(3) Procedures

This information will be obtained by interview and by searching of documents maintained by the media system staff and Building and Grounds Department of the university.

d. System Utilization Data Form

(1) Purpose

An important measure of the performance of a media system is the degree of use it receives.

(2) Sample questions

(a) How many hours per week do students use the media system beyond the required use?

(b) How many times on the average does a student review a program of instruction?

(c) Is the use of the media system increasing or decreasing at the present time, among students and among faculty members?

(d) What is the student load which the system is carrying? (that is, number of students using the system on a weekly basis multiplied by the number of hours of use for each student - paradigm furnished.)

(3) Procedures

Information will be obtained by individual administration of a questionnaire to system directors and faculty members and by group administration of a questionnaire to classes of students using the media system.

e. System Use and Growth Forecast

(1) Purpose

Use of this data form will gather information concerning the forecast utilization level and growth of system capacity.

(2) Sample questions

(a) Looking forward one year, will the intensity of use increase or decrease? Please give percentage factor of increase.

(b) Looking forward one year, will the size of the system be smaller, larger, stay the same? If larger, specify percentage growth.

(c) Looking forward five years, will the intensity of use increase? By what factor?

(d) Looking forward five years, will the size of the system be larger? By what factor?

(3) Procedures

Forecasts will be made by administrators, faculty members, (presently using media systems) and by the system director.

f. Software Cost Estimation Procedure

(1) Purpose

This instrument gathers another component of the total system cost.

(2) Sample questions

(a) What is the cost of software purchased outside annually?

(b) What is the cost of inhouse produced software (cost accumulating procedure provided)?

(3) Procedures

Faculty members and system staff are the best sources for this information. The figures arrived at can be plugged into an included mathematical formula to produce the software cost.

g. Personnel Cost Estimation Procedure

(1) Purpose

A major component of the total system cost is gathered by this data form.

(2) Sample questions

(a) What is the total cost of your technical staff (procedure for accumulation and estimating various costs)?

(b) What part of the faculty user cost can be attributed to the operation and maintenance of the system?

(c) What part of faculty member time is used to produce system software?

(3) Procedures

System director, and in some cases faculty users, will be the best sources of information for this form. Some sources of documented data may be available.

h. System Benefits Measurement and Reporting Form

(1) Purpose

Measurement of the acceptance the media system has received among faculty members and students is the purpose as well as measurement of achievement among students which can be attributed to the media system.

(2) Sample questions

(a) What percentage of students using media systems attend regularly?

(b) All other things being equal, would you choose a media system taught course over a conventionally taught course?

(c) Do you find that the functional requirements of the teaching task are met by the media system?

(d) How many credit hours of instruction can be attributed to media instruction?

(e) Do a greater percentage of students in media taught courses complete instruction than in conventionally taught courses?

(3) Procedures

Data for this section will be gathered by the use of questionnaires administered to students in groups and faculty members, administrative officials, and system staff individually.

i. Faculty Skills Inventory

(1) Purpose

This data form gathers information relative to the skills media users feel faculty members should possess to make efficient use of media systems and the degree to which they believe that faculty members at the institution under study have received training to develop these skills.

(2) Sample questions

(a) What skills do you feel are required to make efficient use of media systems?

(b) Have you received training in the use of media systems?

(3) Procedures

Faculty members and media personnel will be administered this questionnaire individually. The work of Ann Martin at the University of Pittsburgh will be drawn upon in preparing the instruments.

j. Large Sample Group Administration Instruments

(1) Purpose

This instrument gathers data concerning the attitudes, interests, expectations, likes and dislikes of students in regard to media systems.

(2) Sample questions

(a) What do you like about mediated instruction?

(b) What changes are required to improve instruction?

(3) Procedures

These questionnaires will be administered to groups of student users in classroom situations.

k. Case Study Report Form (System Profile)

This short form will be used to accumulate the gross statistics from the other NEW FIELD documents and to calculate the derivative statistics listed in the section entitled, "Products of NEW FIELD."

7. Normative data

While the complete list of specific facts to be generated by the NEW FIELD cannot be specified in its entirety, the following facts are typical:

a. System cost - estimated costs to replace existing system at today's (Fall 1968) prices

b. Space costs - gross annual costs of facility in which the system is operated

c. Use level - estimated annual utilization of the facility in student hours

d. Library size - size of existing software library in hours

e. Personnel costs - gross annual personnel costs for system operation exclusive of student study time

f. Achievement measures -
   - Gross - credit hours earned in courses using the system
   - Net - credit hours attributable to the use of the system

g. Acceptance levels

A number of derivative statistics will then be calculated for individual systems and classes of systems. Examples of these statistics are

- Cost per student hour of study
- Cost per credit hour earned
- Original equipment cost per hour of use
- Maintenance and operating cost per hour of use
- Software development cost per hour of use, etc.

h. Non-numeric data

Two forms of non-numeric data can be reported as a product of the NEW FIELD. One will be a narrative description of characteristics of the system in each of the classes. The other will be statements regarding important issues in the media field. These issues may include:

(1) Faculty release time for software development
(2) Overcoming resistance through familiarity and training
(3) Copyright ownership as an incentive
(4) Does the systems approach "work"?
(5) Need for administrative support, etc.

8. Evaluation means

The published results, together with published instruments used in the data gathering phase, should provide other colleges a basis for self-evaluation.

9. Planning uses

Other institutions considering new media systems (and interested in choosing among alternative learning systems) may use the suggested instruments in their planning activities in such a way as to predict cost and determine effects in advance.

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APPENDIX A

Revised FIELD

ld Instrument for the Evaluation of Learning Devices

NDUCTED BY THE AMERICAN INSTITUTES FOR RESEARCH

RESPONDENT IDENTIFICATION:

NAME ______________________

STUDENT

(USER OF MEDIA SYSTEM)

LEARNING DEVICE IDENTIFICATION:

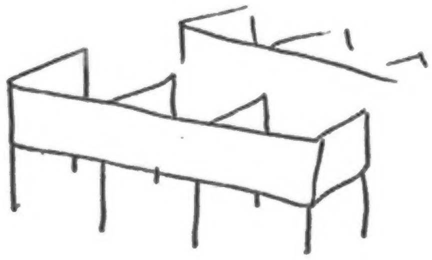
Institution ______________________

☐ CAI ☐ ETV
☐ DAIRS ☐ LL
☐ MM CLASSRM ☐ MICROTEACHING

This questionnaire is part of a larger study conducted by the American Institutes for Research in which Faculty, Staff, and Students are being asked to help evaluate some of the Multi-Media Teaching Devices in use on this campus. Your responses will be merged with the responses of others; your ideas and reactions will be treated confidentially; and no personal identifications will be included in reports concerning the study.

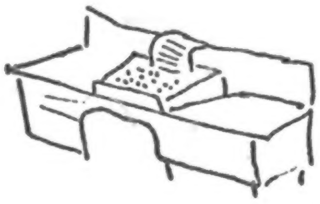
PANEL 1

LL = LANGUAGE LAB



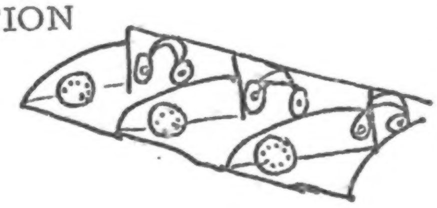
Many booths or desks with earphones for listening / practicing of languages

CAI = COMPUTER ASSISTED INSTRUCTION



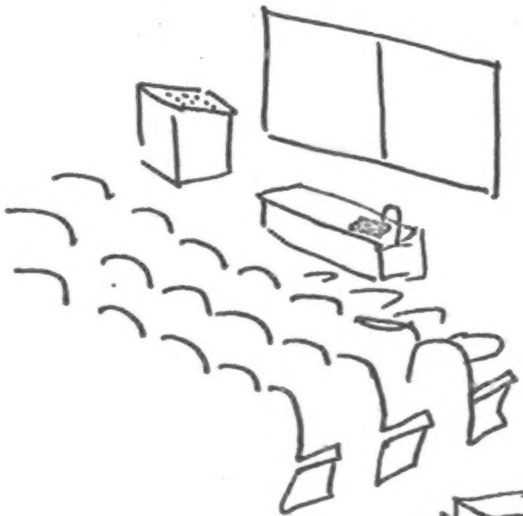
Tele-Typewriter console for input and printout communications with shared-time computer.

DAIRS = DIAL ACCESS INFORMATION RETRIEVAL SYSTEM



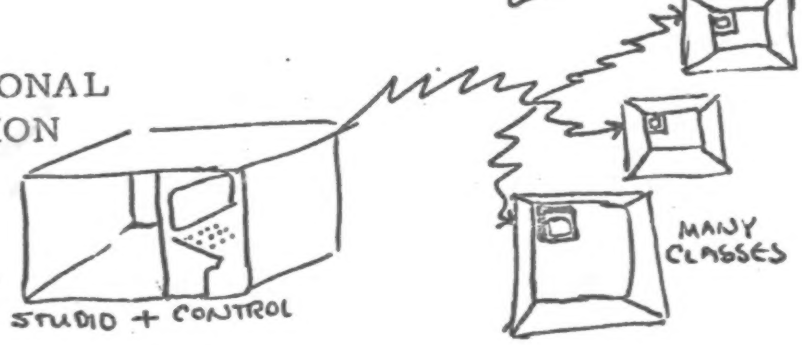
Dial or push button for each student to use in selecting and using audio-tapes (and sometimes visuals or video signals).

MM = MULTI-MEDIA CLASSROOM



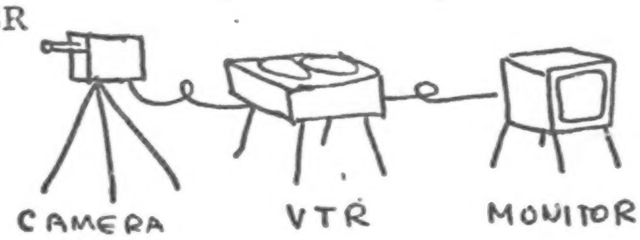
Classroom with screens, speakers, projection equipment for complex audio-visual presentations (sometimes with response buttons at student seats).

ETV = EDUCATIONAL TELEVISION SYSTEM



Television is used to distribute audible & visible information to one or more remote locations.

VTR = VIDEOTAPE RECORDER



A TV camera and tape recorder are used to capture students' audio and visual performance. Playback provides students information needed to improve later performance.

GENERAL BACKGROUND INFORMATION

Name:	____________________
Sex:	☐ Male ☐ Female
Age:	____________
Marital status:	☐ Single ☐ Married
Number of dependents (Exclude yourself)	____________
Student status:	☐ Freshman ☐ Sophomore ☐ Junior ☐ Senior ☐ Graduate ☐ Other (designate)____________
Attendence Level:	☐ Full-time or ☐ Part-time (yourself)
Residence Status:	☐ Commuter ☐ Resident Which do you consider yourself to be?
Major:	Major(s)____________ Minor____________
How many hours per week do you spend on educational activities?	In laboratories (Media and other) Classtime ________ All other ________ (Study, library, research, extra-curricular, etc.) Total Hours ________
Do you work? If yes, how many hours per week?	☐ Yes ☐ No ________ hours per week

Which, if any Media Instructional System do you use in your academic work?

☐ LL ☐ MM
☐ CAI ☐ ETV
☐ DAIRS ☐ VTR

(See preceeding panel of material describing these teaching systems)

STUDENT USE / TIME

The following series of questions explores student use of time and student attitudes toward time use.

During an average week how many hours do you spend using media beyond the scheduled class hours? (If offered only during class, how many hours during class do you use media per week?)

______ number of hours

In general, do you have an opportunity to review or repeat your use of instructional programs?

☐ Yes ☐ No

If yes, how many times can you review or re-use the same material

______ number of times

How many times do you review the material?

______ number of times

Do you think saving your time is an important element to consider when choosing methods of instruction?

☐ Yes ☐ No

Do you think saving your time is an important element to consider when choosing methods of instruction.

☐ Yes ☐ No

TRAINING

These questions explore the availability and type of orientation to use of instructional systems.

What kind of training were you given in the use of media?

☐ None
☐ Written instruction
☐ Demonstrations
☐ Supervised practice
☐ Verbal briefing

(Check all applicable)

f you experience difficulty during he time you use this instructional ystem, what type of assistance is vailable.?

☐ Instructor
☐ Proctor
☐ Equipment advisor
☐ Other (specify) ________
____

The following questions explores the affective lements involved in the use of instructional ystems.

oes the institution periodically assess tudents' attitudes?

toward the subject: ☐ Yes ☐ No ☐ Unknown
toward the medium of instruction: ☐ Yes ☐ No ☐ Unknown

oes the institution periodically assess he students' interest?

in the subject: ☐ Yes ☐ No Unknown
in the medium of instruction: ☐ Yes ☐ No ☐ Unknown

If yes, does the institution make use of these data to modify programs

☐ Yes ☐ No ☐ Unknown

The number of system-taught courses you e and the fact that you choose them may tell something about the level of acceptance of iated instruction at your institution.

NUMBER & CHOICE

the same course were being offered two ays (one using conventional methods & e using mediated instruction) which ould you choose, all other things being ual?

☐ Mediated ☐ Conventional

Have you used more than one multi-media system of instruction?

☐ Yes ☐ No

If yes, which instructional system do you prefer?	☐ LL ☐ MM ☐ CAI ☐ ETV ☐ DIARS ☐ VTR ☐ Other__________ (See panel for explanation)
Would you choose another course taught by the mediated instructional system approach?	☐ Yes ☐ No
What reasons can you give for choosing a course taught by a system of mediated instruction?	☐ Time of day ☐ Required course -- no conventionally taught sections open ☐ Professor ☐ Type of system ☐ Other__________
Did you have a "choice" (to participate or not to participate) in this particular media program?	☐ Yes ☐ No ☐ Unknown
Which type of courses are taught with this system?	Required ☐ ☐ Elective ☐ Unknown

RELIABILITY & SCHEDULING

The questions below examine the effect of faulty systems on the learning process.

Do you find that equipment breakdowns are a problem?	☐ Yes ☐ No
Is equipment generally available when you want to use it?	☐ Yes ☐ No
Do inadequacies in the equipment seriously disturb learning?	☐ Yes ☐ No

What type of problems have you experienced when using media systems?

☐ Insufficient time
☐ Time consuming.
☐ Disciplinary (noisy, inattentive)
☐ Media content not related to course content
☐ Availability
☐ Equipment breakdown
☐ Other ____________

EFFECT

The next set of questions reveals ways of measuring the effectiveness of instructional systems

re you tested on your knowledge or skill pon entering a system instructional program?

☐ Yes ☐ No

When leaving a system taught course are you measured on your acquired knowledge or skill?

☐ Yes ☐ No

Please check those measures f knowledge or skills which re used:

	At the beginning of the course	At the end of the course
Multiple choice or other objective tests		
Essay-type or other subjectively evaluated		
Oral or less structured methods		
Other (designate)______ ______________		

at kind of tests are used?	☐ Unknown ☐ Standardized ☐ Locally devised
you find the measures used to be the most ctive way to evaluate achievement?	Yes No Unknown
s the institution use performance tests an indicator in modifying the instructional tem?	☐ Yes ☐ No ☐ Unknown
you find the use of media systems as tructional tools increasing?	☐ Yes ☐ No
If yes, which factors would you say e contributed to the increased use of the dia systems?	☐ Increased familiarity with system ☐ Growing availability of system ☐ Instructors increasing interest ☐ Additional time for staff to develop materials ☐ Other____________________ __________________________

hese questions attempt to get at problems ociated with lost time in conventional instruction. er these questions on the basis of a course you taking this semester which is not taught with use of instructional media devices.

CONVENTIONAL INSTRUCTION DOWN-TIME

uring your last class meeting in a conventional ituation, could the instructor have covered he material in less time?	☐ Yes ☐ No
If yes, what is the:	full length of the session:____________ actual time required:____________ possible savings in time:____________

Concerning this same conventional instruction course, how many lectures are cancelled by the instructor?

Cancellations
☐ Very few
☐ 1 in 10
☐ 2 in 10
☐ 3 in 10
☐ more
☐ None

How frequently is the instructor late for class?

☐ Very infrequently
☐ 1 in 10
☐ 2 in 10
☐ 3 in 10
☐ more frequently
☐ Never

If the instructor is sometimes late, what is the average length of his late arrival for this course?

____________minutes

Is there a rule (written or unwritten) on this campus regarding how long a class should wait for a tardy teacher?

☐ Yes ☐ No

Comment.

____
____
____
____
____
____

EDUCATIONAL EXPENSE

It is sometimes useful to examine the value students place on a college education in terms of financial expense and time committments they make to it. These questions pursue this line of reasoning.

Please estimate the gross cost per year of your college education (consider tuition, room and board, books, clothing, transportation and all other expenses incurred).

$____________

Gross cost per year

How is this expense borne? Use fractions to indicate the portion of the total expense paid:

(1) by you (from earnings and savings

My contribution
/

(2) by your family (cash, loans, etc.)

Family contribution
/

(3) by the college or society in general (subsidies, tuition reductions, scholarships, and other support).

Other support
/

How many days are there in the academic year at your institution (deduct vacation, holidays, weekends, etc.) and figure out the approximate number of days per year you devote to educational activities)?	☐ days academic year
How many hours a day (on the average) do you devote to direct "curricular" educational activities (in class, studying, research, library, etc.)?	☐ curricular hours
How many hours a day (on the average) do you devote to extra-curricular but significant collegiate activities (college-related but not recreational)?	☐ additional hours

d Instrument for the Evaluation of Learning Devices

DUCTED BY THE AMERICAN INSTITUTES FOR RESEARCH

RESPONDENT IDENTIFICATION:

Name ____________________________

INSTITUTION ____________________________

STUDENT

(At Large)

LEARNING DEVICE IDENTIFICATION:

Institution ____________________________

☐ CAI ☐ ETV

☐ DAIRS ☐ LL

☐ MM CLASSRM ☐ MICROTEACHING

This questionnaire is part of a larger study conducted by the American Institutes for Research in which Faculty, Staff, and Students are being asked to help evaluate some of the Multi-Media Teaching Devices in use on this campus. Your responses will be merged with the responses of others; your ideas and reactions will be treated confidentially; and no personal identifications will be included in reports concerning the study.

STUDENT - INDEX

GENERAL BACKGROUND INFORMATION 1

MEDIATED INSTRUCTION 2

AFFECT 4

EFFECT 5

INSTRUCTION DOWN/TIME 6

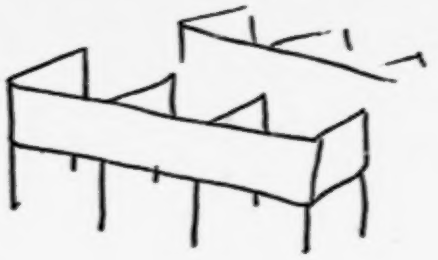
EDUCATIONAL EXPENSES 7

GENERAL BACKGROUND INFORMATION

Name:	________________
Sex:	☐ Male ☐ Female
Age:	________
Marital status:	☐ Single ☐ Married
Number of dependents	________
Student status:	A. ☐ Freshman ☐ Sophomore ☐ Junior ☐ Senior ☐ Graduate ☐ Other (designate) ________ B. ☐ Full-time or ☐ Part-time C. ☐ Commuter or ☐ Resident
Major:	Major(s) ________ Minor ________
How many hours per week do you spend on educational activities?	In lab ________ Classtime ________ All other ________ Total hours ________

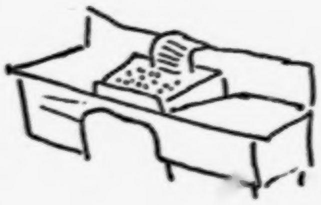
PANEL 1

LL = LANGUAGE LAB



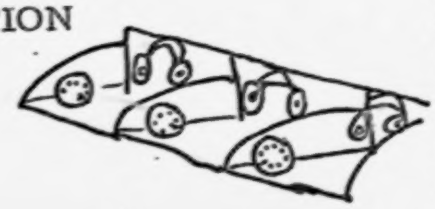
Many booths or desks with earphones for listening / practicing of languages

CAI = COMPUTER ASSISTED INSTRUCTION



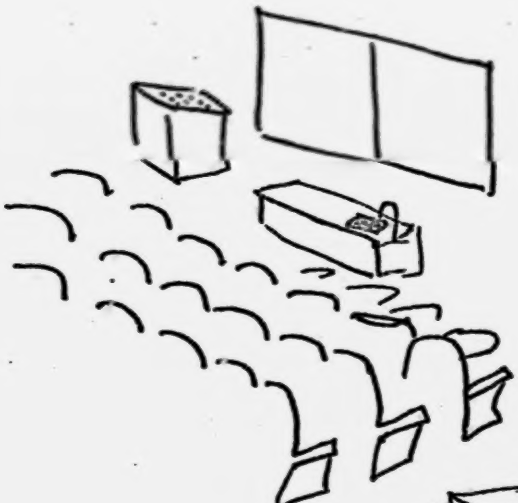
Tele-Typewriter console for input and printout communications with shared-time computer.

DAIRS = DIAL ACCESS INFORMATION RETRIEVAL SYSTEM



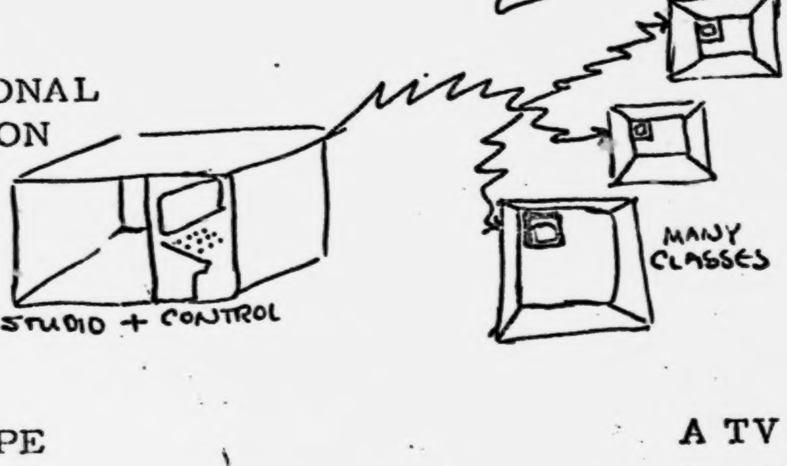
Dial or push button for each student to use in selecting and using audio-tapes (and sometimes visuals or video signals).

MM = MULTI-MEDIA CLASSROOM



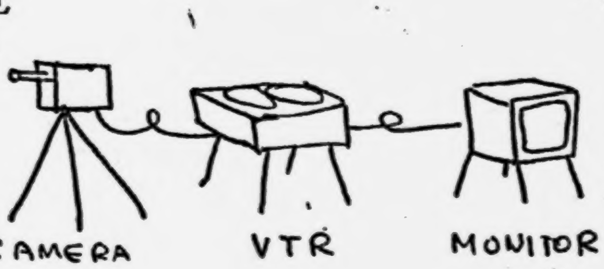
Classroom with screens, speakers, projection equipment for complex audio-visual presentations (sometimes with response buttons at student seats).

ETV = EDUCATIONAL TELEVISION SYSTEM



Television is used to distribute audible & visible information to one or more remote locations.

VTR = VIDEOTAPE RECORDER



A TV camera and tape recorder are used to capture students' audio and visual performance. Playback provides students information needed to improve later performance.

Do you work?	☐ Yes ☐ No
If yes, how many hours per week?	____________hours per week

MEDIATED INSTRUCTION

Do you use any Media Instructional System in your academic work?	☐ LL ☐ MM ☐ CAI ☐ ETV ☐ DAIRS ☐ VTR (See preceeding panel of material describing these teaching systems)
Have you heard any of these comments about mediated instruction courses at this institution?	☐ "The teaching is planned better" ☐ "You don't have to attend class regularly" ☐ "The professor is more effective" ☐ "The professor 'doesn't come across'" ☐ Too many people for the available equipment. ☐ No communication with Professor ☐ Poor sound and/or image quality ☐ Content not related to tests

In your opinion is the cost of an instructional system too great in relation to the effectiveness of such systems? Or is the cost "worth it" in terms of speed or ease of learning?	☐ Yes, costs too much ☐ No, worth what it costs ☐ Unknown
In your opinion, do students using instructional systems consume more time in study than students in conventionally taught classes? Or do classes taught with media systems use less student time?	☐ Require more time ☐ Require less time ☐ Unknown

The following questions explore student feelings concerning the use of various instructional methods.

AFFECT

Does your institution periodically assess the students' attitudes?	toward the subject: ☐ Yes ☐ No ☐ Unknown toward the instruction: ☐ Yes ☐ No Unknown
Does the institution periodically assess the students' interest?	in the subject: Yes ☐ No Unknown in the medium of instruction: Yes☐ No☐ Unknown
Does the institution make use of this data to modify programs?	☐ Yes ☐ No ☐ Unknown
Do you feel that your attitude towards a particular training medium is an important element in learning effectiveness?	☐ Yes ☐ No

The next set of questions reveals ways of measuring the effectiveness of instructional systems.

EFFECT

(Exclude standardized tests used as college entrance or placement purposes.)

☐ Yes ☐ No

Are you measured on your acquired knowledge or skil before completing courses at this institution ?

☐ Yes ☐ No

What measures of knowledge or skills are used?

	prior to entering	after the course
Multiple choice or other objective tests		
Essay-type or other subjective-type		
Oral and less structured methods		
Other (designate)		

Do you find the measures used to be an effective way to evaluate achievement?

☐ Yes ☐ No

Do you think the institution uses performance tests as an indicator in modifying the instructional system?

☐ Yes ☐ No ☐ Unknown

Do you find the use of modern devices and instructional media systems as teaching tools increasing?

☐ Yes ☐ No

INSTRUCTION DOWN / TIME

These questions attempt to get at problems associated with lost time in conventional instruction. Answer these questions on the basis of a course you are taking this semester which is not taught with the use of instructional media devices.

During your last class meeting in a conventional situation, could the instructor have covered the material in less time?

☐ Yes ☐ No

If yes, what is the:

full length of the session: ______

actual time required ______

possible savings in time: ______

Concerning this same course taught by conventional media, how many lectures are cancelled by the instructor?

Cancellations
- ☐ Very few
- ☐ 1 in 10
- ☐ 2 in 10
- ☐ 3 in 10
- ☐ more

How frequently is the instructor late for class?

- ☐ Very infrequently
- ☐ 1 in 10
- ☐ 2 in 10
- ☐ 3 in 10
- ☐ more frequently

What is the average length of late arrival for the instructor in this course?

______ minutes

Is there a rule (written or unwritten) on this campus regarding how long a class should wait for a tardy teacher?

☐ Yes ☐ No

Comment:

______

______

______

______

______

It is sometimes useful to examine the value students place on a college education in terms of financial expense and time committments they make to it. These questions explore this line of reasoning.

EDUCATIONAL EXPENSES

Please estimate the gross cost per year of your college education (consider tuition, room and board, books, clothing, transportation and all other expenses incurred and include summer school if you attend.)

$ ____________________
Gross cost per year

How is this expense borne? Use fractions to indicate the portion of the total expense paid:

(1) by you (from earnings and savings)	My contribution ☐ / ☐
(2) by your family (cash, loans, etc.)	Family contribution ☐ / ☐
(3) by the college or society in general (subsidies, tuition reductions, scholarships, and other support).	Other support ☐ / ☐

How many days are there in the academic year at your institution (deduct vacation, holidays, weekends, etc.) and figure out the approximate number of days per year devoted to educational activities? (Include summer if included in cost estimate above.)

☐ days
academic year

How many hours a day (on the average) do you devote to direct "curricular" educational activities? (Include study, classes, i.e. all educational activities.)

☐
curricular hours

How many hours a day (on the average) do you devote to extra-curricular but significant collegiate activities?

☐
additional hours

ld Instrument for the Evaluation of Learning Devices

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RESPONDENT IDENTIFICATION:

Name ____________________

Title ____________________

TEACHER

(User of M M System)

LEARNING DEVICE IDENTIFICATION:

Institution ____________________

☐ CAI ☐ ETV

☐ DAIRS ☐ LL

☐ MM CLASSRM ☐ MICROTEACHING

This questionnaire is part of a larger study conducted by the American Institutes for Research in which Faculty, Staff, and Students are being asked to help evaluate some of the Multi-Media Teaching Devices in use on this campus. Your responses will be merged with the responses of others; your ideas and reactions will be treated confidentially; and no personal identifications will be included in reports concerning the study.

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FACULTY DESCRIPTION

The following series of questions gives a "thumbnail sketch" of the faculty. This refers to number and breakdown of faculty time.

What type of research is emphasized at this institution?

☐ behavioral research
☐ mathematical, chemical, biological, physical, etc.
☐ medical
☐ none ______________________
☐ other (designate)
____

Please estimate the percent of time you spend on the following:

___ under graduate instruction
___ classroom preparation
___ professional activities outside university
___ research
___ academic administration
___ counselling
___ graduate instruction
___ other ______________________
100%

Data on system use is required in order to establish the usefulness of a system. This series of questions is to be answered by selected teachers who use the system. Their answers should be cast in terms of those courses they are currently teaching, using the device under study.

STUDENT LOAD

How many students do you have participating in courses using this teaching media system?	Mediated Instruction _________ (number of students)
How many hours per week (on the average) do they use the system?	_________ (hours) for one student
The gross number of student hours/week is	_________ (calculate from above)
Please assume that this same course were being taught by conventional means. Estimate the gross time required to cover the same material with equivalent success in terms of achievement level.	Conventional Instruction _________ (number of students) _________ (hours) for one student _________ Gross student hours
Calculate or estimate the percentage of the students in this teaching situation who attend regularly.	_________ %

PREREQUISITES

times the prerequisites or "input hurdles" have a found effect on the output of a multi-media system. series of questions attempts to obtain information on how dents are selected (or select themselves) for courses taught this multi-media system.

hich type of courses are taught with is system?	Required Elective ☐ Unknown Yes ☐ No ☐
the course you teach using this system, so taught without recourse to a multi- edia teaching system?	☐ Yes ☐ No
o you think students choose a course taught media systems over courses taught by nventional methods of instruction?	☐ Yes ☐ No ☐ Maybe Please comment: ____________________ ____________________ ____________________ ____________________ ____________________
both conventional and mediated instruction re available, what percent of the total umber of students would select mediated struction?	________ percent
s this course open to any student at the niversity?	☐ Yes ☐ No
If no, how are students selected for nrollment in this course?	☐ By instructor interview ☐ By passing grade on prerequisite course ☐ By simple developmental growth (for example, achieving sophomore status, regardless of the freshman course mix) ☐ College counselor approval ☐ Demonstrable academic need (failure of comprehensive or other test) ☐ Progression in curriculum Other entrance hurdle ________ ____________________ ____________________

hich of the following student characteristics
re considered when selecting a population to
articipate in a system mediated instructional
rogram?

☐ Age
☐ Sex
☐ Aptitude
☐ Interests
☐ Skills
☐ Knowledge

e intellectual aptitude scores (I.Q., etc.)
important variable in choosing students
participate in system instructional programs?

If yes, what measures are used?

If no, please comment.

☐ Yes ☐ No

e students pre-tested during the beginning
a course to determine the level of knowledge
skill prior to beginning the system instruc-
nal program?

If yes, please specify the form of pre-test used.

☐ Yes ☐ No

☐ A final exam of prerequisite course serves as pretest for this course
☐ A pre-test is used to determine admission to this course
☐ A pre-test is given to all registrants at the beginning of this course
☐ Oral or other informal evaluation is made at the beginning of the course
☐ Other (please specify)__________

re-tests are used, do you believe they
asure knowledge, skills, or aptitude?

☐ knowledge
☐ skills
☐ aptitudes

This series of questions has to do with evaluation patterns
student achievement. To measure student achievement or
rminal behaviors is one way to evaluate system effectiveness.

EVALUATION

Which type of evaluation pattern do you use?

☐ Essay & Performance Tests
☐ Orals & Unstructured Interviews
☐ Objective tests such as multiple choice
☐ Situational observation
☐ Other (specify) ____________

Please explain briefly each of those checked

Which measure(s) do you find to be the most effective in terms of determining completion of course requirements?

Would you use different measures for a different type of media device?

Which measure (s) do you find to be the east effective for the purpose of evaluating student achievement? Why?

tests are used to discriminate among students re they marked "on the curve" or is there a astery standard which, if all could beat, all ould pass?	☐ marked "on the curve" ☐ mastery standard
tests are used to measure achievement, hat kind of tests are they?	☐ locally devised ☐ standardized
If you use periodic series of tests, how frequent are they?	☐ weekly or less ☐ quarterly ☐ mid-term
Do your tests measure Cognitive Functions? If so which:	☐ Yes ☐ No ☐ Comprehension ☐ Analysis ☐ Knowledge ☐ Synthesis ☐ Application ☐ Evaluation (See Bloom's Taxonomy)
Does your final evaluation bear any relation to your prerequisite or selection method?	☐ Yes ☐ No If yes, how related? ________ ________
Do you feel tests written for the purpose of discriminating among students or to establish a standard of mastery can also be used to measure system effectiveness?	☐ Yes ☐ No
If no, what form, style, manner of testing can be used to measure system effectiveness (as opposed to student achievement)? Describe.	________ ________ ________ ________ ________ ________
What tests are peculiarly adapted to administration through the instructional media system itself?	________ ________ ________ ________

Is change in student attitude toward a subject or training medium an important goal in your teaching system?

☐ Yes ☐ No

Do you have any system (other than the grapevine) for assessing student attitudes:

toward the subject: ☐ Yes ☐ No
toward the medium of instruction: ☐ Yes ☐ No

If no, do you feel attitude change can/should be measured?

can: ☐ Yes ☐ No
should: ☐ Yes ☐ No

why? ______________________________

____

____

ATTENDANCE CONSTRAINTS

Sometimes the student body tends to measure the value of an instructional offering in accordance with the importance attached to it by faculty.

f use of this system is voluntary, please ive an example of the meaning of "voluntary"?

____

____

____

____

____

____

____

f use of this system is compulsory, please ive an example of the meaning of "compulsory"?

____

____

____

____

____

____

his course taught by mediated instruction can compared with a course taught in a conventional traditional manner, is student attendance higher lower than attendance in the comparable nventional course?

☐ Lower in system taught
☐ Higher in system taught
☐ Not comparable

Registration and attendance are not the only measures f use. It is also important to determine the proportion f students who complete system taught courses.

COURSE COMPLETION

f the total number of students signed up to ke a course taught by mediated instruction, hat percentage (estimated) remain in the ourse?

______ Estimated % completing course

f those who do not remain in the course, hat percentage give "the system" as a reason r dropping out of the course?

______ Fractional part of the above percentage not completing the course

When a significant number of students selects additional courses (in the field to which they were introduced by mediated instruction) does this connote effective instruction in the first course?

AFFECT MEASURES

The next questions examine affect, such as, interest, ttitude and attitude change in relation to the goals of the eaching system.

Is student interest in a subject or career an important goal in your teaching? Explain.

☐ Yes ☐ No

How do you identify it?

Are students' interests measured? ☐ Yes ☐ No

If yes: At input point? ☐ Yes

During process? ☐ Yes

After completion? ☐ Yes

If yes, what interest measures do you use?

If no, do you feel that interest can be measured before a student enters a system instructional program?

☐ Yes No Unknown

RATING SYSTEM

Rating	Definition
3	IMPORTANT: This statement describes an important aspect of the matter under consideration.
2	SIGNIFICANT: This statement describes a significant, but somewhat less important aspect or element of the matter under consideration.
1	NOT INFLUENTIAL: This statement may have bearing on the matter but is among the less influential issues.

It is often useful to assess faculty attitudes
cerning the increasing or decreasing use of mediated
ching systems in colleges].

TEACHER ATTITUDES

ease rate (see rating system on preceeding
ge) the factors with respect to their impor-
nce to the increased use of this media system
an instructional tool:

______ Increasing faculty familiarity with system.
______ Increasing student familiarity with system.
______ Improved availability of system (or increased capacity)
______ Instructor's interest or incentives
______ Encouraging additional time for software development
______ Adequate "off-the-shelf" materials (software)
______ Consistent and adequate budgeting
______ Adequate supplies and materials (tape, film, etc.)
______ Faculty Training

o you feel that the quality of your overall
nstruction is enhanced by the sometime use of
ulti-media systems? (i. e.: does effort to
evelop good mediated instruction "rub-off" on
our regular instruction preparations or activi-
es?)

☐ Yes ☐ No

____
____
____
____
____

es use of multi-media allow a better utilization teacher resources?

☐ Yes ☐ No

How so?

____

____

____

____

ith respect to time use when teaching with ediated instructional systems, do you find at:

☐ Use more time overall
☐ Use same time overall
☐ Save time overall

you "save" time, how do you devote the me you have saved?

☐ Other teaching activities
  ☐ further preparation
  ☐ more group instruction
  ☐ tutoring & counseling
  ☐ evaluation activities
☐ Off campus consulting & conferencing
☐ Research & writing
☐ Administrative duties

f you "require more time" where do you cut to obtain time for mediated instruction?

☐ Teaching duties
  ☐ preparation
  ☐ instruction
  ☐ tutorial
  ☐ evaluation
☐ Off-campus consult/confer etc.
☐ Research & writing
☐ Administrative duties
☐ Leisure-owntime
☐ Other (specify) ______________________________

____

These questions seek information on the relation between use of media and quality of instruction generally.

EFFECT ON INSTRUCTION

Do you feel that the use of a media system places an instructor in a new role?

☐ Yes ☐ No

If yes, what are the salient features of this change in role?

If no, why not?

Do you have problems integrating the use of media devices with your course objectives?

☐ Yes ☐ No

What skills or personality characteristics do you feel you need,. to effectively use multi-media?

Which of the above skills did you receive rom "in-service" training?

Do you feel your training has been adequate o effectively handle this instructional system?

☐ Yes ☐ No

From your standpoint as an instructor, are ou satisfied with the present-use of nstructional system?

☐ Yes ☐ No

If no, what do you think can be done to mprove the situation?

ould additional opportunities for faculty raining in the use of teaching systems be n important factor in increased media ystem use?

☐ Yes
☐ No

hich of the following elements of faculty rientation or training would be of most alue to you? (Rate according to the reviously defined rating system)

— Mechanical or electronic manipulations of the equipment
— Techniques of preparation of software for the system
— Improvement of presentation and teaching techniques (personal presentation skills)
— Technical assistance and orientation in the preparation of teaching objectives, course development, etc.
— Educational Psychology
— Overview of media
— Learning theory
— Others (please specify) ______________

In your view, is the use of the system increasing, stabilized, or decreasing at this point in the life of the teaching system?

Steeply

Slowly

Flat

Decreasing

FORECAST

Effectiveness of a system can sometimes be inferred from people's intention to expand its use or size.

Looking forward one year:

Will the intensity of use be:

smaller	same	half	doubled	more than doubled	______ times larger

Will the size of the system be:

smaller	same	half again larger	doubled	more than doubled	______ times larger

Looking forward five years:

By how large a factor will your needs be increased: (over the present system)

0	1/2	1	2	5	10	______ times larger

What is your expected percentage of increase in enrollment over 5 years?

______________________%
percent

Please estimate the financial outlay for expansion of this type of system:

During next one year budget?

$ ______________
(round figures)

During next five-year period?

$ ______________
(estimate please)

LEADERSHIP

ometimes there is one faculty member of pervasive influence hose energy "powers" the multi-media system. The control-ing factor here is whether the removal of such a person by dvancement or employment in some other institution would ave a gross adverse effect on effective multi-media system mplementation.

Do you feel there is one person whose absence would cause the program to become static or lose momentum?

If yes, give title.

☐ Yes ☐ No

Title ____________

FIDELITY REQUIREMENTS

Setting aside, for the moment, questions of general ontent appropriateness let us examine the signal quality, idelity, "presence" and "style" factors in teaching aterials.

Generally speaking, is the teaching material used in your system of a sufficient fidelity or technical quality to take advantage of the operational qualities of the hardware in your system?

☐ Software loses more fidelity and quality through mediation than it should.

☐ Software quality is consistent with mediation system quality.

☐ Software of low quality is often used in a higher quality mediation system.

Are you satisfied with the present status of the software use in the system?

If no, what do you think can be done to improve the situation?

☐ Yes ☐ No

____

____

____

Have functional specifications been written (or adopted) for the software used with this system?	☐ Yes ☐ No Describe:
Please supply and insert behind this page a system diagram or sketch showing how the components of the system are related or used (in the functional relationship sense).	(Use back of this page, please.)
In general, are the functional requirements of the teaching task met by the operational characteristics of the system?	☐ Yes ☐ No If no, please specify problems:

e selection of "off-the-shelf" software for use in college
aching is often left to the individual teacher who is
eparing the course. Other measures and efforts can add
the effectiveness of selection procedures.

SOFTWARE SELECTION

llowing is a list of means for making gements concerning the effectiveness of ching materials. Please rate (use viously defined rating system) those ans now used to guide selection of teaching terials:

— Intuitive judgement of responsible professors
— Collective intuitive judgement of responsible team, "jury" or committee
— Effectiveness rating based on pre-test-use-post-test study
— Student preferences or ratings from earlier course presentation
— Materials selections based in part on state, regional or national course development activity (give source (Modern
— Language Assn., medical groups, engineering groups, etc.
— Other (please specify)________________

____

f you use means other than those listed bove for estimating or establishing the ffectiveness of teaching materials prior o their adoption in the classroom or teaching ystem under evaluation, please describe:

____

____

____

____

SOFTWARE COSTS

t is sometimes useful for faculty to analyze the ive cost of preparing unique materials, using ntional teaching techniques, and using prepared, ased materials. The following questions may help t this question.

'ake into consideration the cost of: published materials, texts, library resources which are allocated for this course (assigned nd research), and other information resources which are purchased from outside ources. Attempt to assign a cost per student our for purchased material/ Consider life xpectancy of text materials, life expectance f library acquisitions and other factors which cause cost per student hour to rise.

$$\frac{\text{Cost\_\_\_\_\_}}{\text{student time spent\_\_\_\_\_}} = \text{Cost per hour\_\_\_\_\_}$$

Computation

$$\frac{\text{Gross cost of all published materials used in course}}{\text{Gross number of hours student time spent with published materials}} = \text{Cost per hour of educational activity derived from published materials}$$

Please perform a similar computation for prepared materials. Here again effort should be devoted to estimating life expectancy of on-campus prepared materials. Are lecture notes, tapes, lab guide worksheets, and other locally prepared materials used for more than one semester? How does this effect the cost per hour of instruction estimated?

$$\frac{\_\_\_\_\_\ \text{cost of staff time}}{\text{number of student}\ \_\_\_\_\_\ \text{hours}} = \text{Cost per hour}\ \_\_\_\_\_$$

Computation

$$\frac{\text{Gross dollar cost of staff time spent preparing for and delivering lectures and locally preparing teaching materials}}{\text{Gross number of student hours using locally prepared materials and attending lectures}} = \text{Cost per hour of educational activity derived from on-campus prepared materials}$$

CRITIQUE

We would like to have some information from you concerning the method and content of our study.

Are there questions you expected us to ask which we have overlooked? Please discuss. ______________________________

What do you like about this project? ______________________________

What do you not like about this project? ______________________________

d Instrument for the Evaluation of Learning Devices

NDUCTED BY THE AMERICAN INSTITUTES FOR RESEARCH

RESPONDENT IDENTIFICATION:

Name ______________________

INSTITUTION ______________________

FACULTY

(At Large)

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general, how well are you acquainted with
e media teaching-learning system
sed on this campus?

☐ Never heard of it
☐ Am familiar with it
☐ Have used it
☐ Other (designate)________________
____

Vhat is your attitude toward the media
ystem on this campus?

☐ Positive
☐ Neutral
☐ Negative
☐ Other (explain)
____

What is your attitude toward the use of
these newer methods in higher education,
in general.

☐ Positive
☐ Neutral
☐ Negative
☐ Other (explain)
____

What do you think about the cost of these
systems used on this campus?

☐ Don't know
☐ Cost too much
☐ Cost is commensurate with benefits
☐ Benefits outweigh the costs
☐ Other (specify)________________
____

What do you think about the cost of these new systems, in general?

☐ Do not know
☐ The costs tend to outweigh the benefits
☐ The costs tend to be commensurate with the benefits
☐ The benefits tend to outweigh the costs
☐ The cost-benefit comparisons would vary with the type and use of a particular system
☐ Other (please specify) ________
____

Do you think the present use of the system on this campus represents a saving in student learning time?

☐ Yes
☐ Do not know
☐ No
☐ Other (please explain) ____
____
____
____

Do you think that the effective use of such systems can save learning time for students?

☐ Yes
☐ Do not know
☐ No
☐ Other (please specify)
____
____

Do you think that the goals of the multi-media system being used on this campus are presently being achieved?

☐ Yes
☐ Do not know
☐ No
☐ Other (please specify) ______
____

Do you think the goals of this institution would be better served by appropriate and increased use of such multi-media systems?

☐ Yes
☐ Do not know
☐ No
☐ Other (please specify)____

Do you think that the use of such multi-media systems can lead to more effective use of the instructors' time?

☐ Yes
☐ Do not know
☐ No
☐ Other (please specify)____

Please use the following space for additional comments or questions?

CRITIQUE

We would like to have some information from you concerning the method and content of our study.

Are there questions you expected us to ask which we have overlooked?

Please discuss. ____

What do you like about this project? ____________________________

What do you not like about this project? ________________________

d Instrument for the Evaluation of Learning Devices

DUCTED BY THE AMERICAN INSTITUTES FOR RESEARCH

RESPONDENT IDENTIFICATION:

Name ____________________

Title ____________________

TECHNICIAN

LEARNING DEVICE IDENTIFICATION:

Institution ____________________

☐ CAI ☐ ETV

☐ DAIRS ☐ LL

☐ MM CLASSRM ☐ MICROTEACHING

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IDENTIFICATION OF SYSTEM

What is the name of the system?

____

____

____

Do you consider this a discrete system or a sub-system electronically interconnected with other electro-mechanical teaching complexes or systems?

☐ Discrete ☐ Interconnected

On the next page please check all the input means used in connection with this system

INPUT ARRAY

- Verbal
  - Printed
    - Film
      - Microfiche ☐ ie:ERIC
      - Strip film ☐ MAST
      - Transparencies ☐ Print only
      - Slides (2x2) ☐
        (lantern) ☐
    - Paper
      - Books ☐ Texts
      - Worksheets ☐
      - Panel/charts ☐ Wallmaps
      - Games ☐ Monopoly
      - Rolls ☐ "printout"
    - Embossed
      - Braille ☐
  - Spoken
    - Oxide
      - Tape ☐ audio
      - Discs ☐ · computer memory
      - Flat stock ☐
      - Stripe on film ☐ 16mm sound on film eqpt.
    - Radio ☐ Educ. radio
    - Optical
      - On film edge ☐ Regular 16
      - In film frames ☐ Kalart device
    - Mechanical
      - Records ☐ 331/3/45/78
      - Belts ☐ Dictaphone
    - Realia Live (lectures) ☐ Professors
  - Manual Alphabet ☐ Sign Language
- Pictorial
  - Still
    - Film
      - Strips ☐
      - Slides ☐
    - Paper
      - Books ☐ Texts,
      - Loose sheets ☐ Pamphlets
      - LDX-FAX, etc. ☐ LDX
    - Cathode ray-Tonotron/VTR ☐ "Stop Action"
      "Still"/Westinghouse disc. ☐
    - Realia
      - Objects ☐ To Be
      - Kits ☐ Assembled
  - Motion
    - Film
      - 16mm/35mm ☐ Conventional/ Silent
      - 8mm loop ☐ Technicolor
    - Tape
      - VTR ☐ "Instant Replay"
    - TV
      - Live ☐
    - Live
      - Demonstration ☐
      - Role play & other student ☐

dd categories if the system has other
eans for presenting information (or stimuli).

RESPONSE OPTIONS

The responses evoked by multi-media teaching systems ry over a wide range. Some are in the form of oughts, insights and understandings which are never xpressed externally. Others, like page-turning in a rowderian branched program, are only the external bservable evidence of far more complicated responses nd chains of reasoning. The following questions ttempt to clarify and define the response options ossible with the media system under study.

heck all of the response modes characteristically used by students in courses which use this media system.

umerical responses

☐ Handwritten computations
☐ Key-punched computations
☐ Marking selected answers
☐ Entering numerals as symbols

isual response patterns

☐ Drawing sketches
☐ Selecting displayed pictorial alternatives
☐ Light-pen constructions for electronic comparison to models
☐ Performance responses
  ☐ Constructions
  ☐ Completions
  ☐ Generalized role-play
  ☐ Apprentice emulation

an you define other response modes hich students use with this system? lease enumerate. ________________

____

____

____

Verbal Response

☐ No overt action
☐ Push buttons (Edex)
☐ Page-turning (Crowder)
☐ Mark sensing (Tests)
☐ Symbol Entry (Entry of a symbol in a blank space to denote choice of alternatives.

Utterances

☐ Unrecorded
Recorded
  ☐ For immediate comparison by monitor
  ☐ For immediate comparison by student
  ☐ For later playback by monitor
  ☐ For later playback by student

Hand written

☐ Unsystematic notes, not saved
☐ Preserved for student use and evaluation
☐ Preserved for monitor comparison or correction (papers, etc.)
☐ Displayed on cathode ray tubes

Typed verbal responses

☐ Unpreserved
☐ Preserved for student comparison (notes)
☐ Preserved for monitor evaluation (papers, reports, etc.)
☐ Typed into computer for comparison with computer-held model.
  ☐ Held in computer memory
  ☐ Lost after comparison

Are there other response options not mentioned above or sub-classifications not given above which would prove more meaningful to educators attempting to plan educational presentations? If yes, please mention in the space provided.

☐ Yes ☐ No

Comment ____________________

____

____

____

STUDENT CONTROL OF TEACHING SYSTEM ADVANCE

Does this system permit student responses or other activities to control the development of the instructional presentation?

If yes, which of the following types of response can be accomodated?

☐ Yes ☐ No

- ☐ Constructed responses (utterances, typewritten entries, etc.)
- ☐ Selected responses (push-button, light-pen, etc.)
- ☐ Other (please describe) __________

____

____

FEEDBACK CAPABILITIES

Feedback of knowledge of the correctness of his response to the student is frequently an important part of a teaching system. The correctness of these feedback provisions and their promptness have a direct bearing on the efficiency of the teaching system. The following questions pursue this issue.

Does this teaching system make provision for any feedback concerning the correctness of student responses during the periods of use?

☐ Yes ☐ No

If yes, what is the approximate delay between emission of a response and the provision of feedback (give time in seconds or fractional parts of a second)?

____________ Seconds

Which of the following statements best describes the nature of the feedback which is provided?

- ☐ A correct model for self-comparison by the student
- ☐ A simple announcement of the incorrectness or correctness of the response (comparison with the model having been accomplished by the system equipment rather than the teacher or student).
- ☐ Corrective feedback (equipment reports on deficiencies in the student response and provides corrected response).
- ☐ Other (please specify) __________

____

____

Is this system an "all or nothing" system (that is, do system failures block out all or part of the system)? Or does failure cause a progressive attrition in signal quality or learning facility without shutting down the system completely?	☐ All ☐ Part
Total system failures:	☐ Possible ☐ Common ☐ Unlikely ☐ Never
Modules or units fail:	☐ Often ☐ Sometimes ☐ Never
Quality deteriorates:	☐ Often ☐ Occasionally ☐ Seldom ☐ Never

Are you satisfied with the present functioning of the hardware in the system?

☐ Yes ☐ No

If no, what do you think could be done to improve the situation?

Describe ____________________

____

____

____

RATIONALE FOR SELECTION

n general, when essentially similar mulus material could have been conveyed other means at lower cost, it is important recapitulate the arguments used to justify selection in the first place.

Why was this system selected over other systems capable of conveying equivalent signals to the same sensory apparatus and decoding paths?

____

____

____

(1) If system is CAI, why were concepts like PI, Text and test, and workbooks passed over?

(2) If system is DAIRS, why were language lab, phonograph, telelecture, live-speech and radio, etc. passed over?

(3) If system is Multi-Media classroom, why were carrel applications, audio-tutorial methods, conventional audio-visual programs and library resources passed over?

(4) If system is closed circuit television, why were open-circuit television film programs, tape/slide programs, phonograph-plus-filmstrip presentations and other mailable multi-sensory media passed over?

(5) If system is video-tape recorder, why were role play, games, classroom simulator, etc. passed over?

Still another question: Are any of the following reasons important in understanding the selection of this specific system over others of its class?

☐ Improved teaching of regular subjects.

☐ Standardized teaching of regular subjects.

☐ Pedagogical innovation made possible.

☐ Improved fidelity of image made possible.

☐ Equipment reliability improvement expected.

☐ Economy anticipated (explain how)

____

____

____

☐ Versatility of medium compared to other alternatives.

☐ Acceptability of this medium to teachers.

☐ Acceptability of this medium to students.

☐ Motivational aspects of student response to equipment.

☐ Other reasons (please explain)

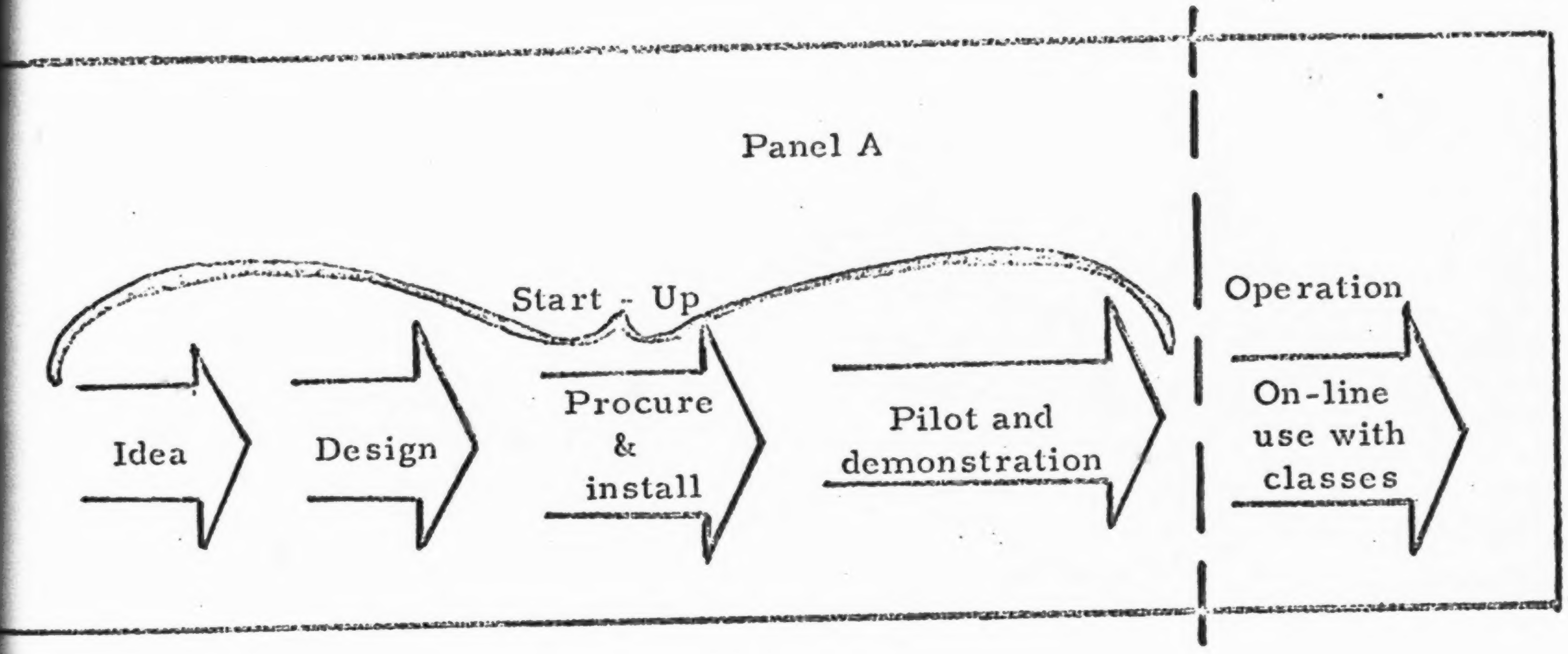
____

____

____

____

____


Panel A
Start - Up
Operation
Idea
Design
Procure
&
install
Pilot and
demonstration
On-line
use with
classes

START-UP PHASE

The preceeding diagram labeled, "panel A", indicates
at a number of preliminary activities can be grouped
gether and referred to as the "start-up" period.
osely speaking, these are all the events which occur
fore faculty are permitted to schedule regular, continuing
-line academic use of the system.

What kinds of problems were encountered during the "start-up" phase?

☐ tune-up and shake-down
☐ manufacturer doesn't follow through
☐ component not compatible or appropriate
☐ failure of delivery schedules
☐ other (specify) ______________
____

During the design phase were functional specifications written?

If so, please provide; if not, please re-construct in the space provided.

☐ Yes ☐ No

____
____
____
____

Were technical specifications written (describing the mechanical and electronic operations and equipment which would be necessary to achieve the functions described in the functional specifications)? If so, please provide; if not, please re-construct in the space provided.	☐ Yes ☐ No ____________________ ____________________ ____________________ ____________________
Have functional and technical specifications been written (or adopted) for the software to be used with this system?	☐ Functional Software Specifications ☐ Technical Software Specifications ☐ Guidelines only ☐ Publications
Please supply a system diagram or sketch showing how the components of the system are related or used (in the functional relationship sense). Use facing page.	
Are there special arrangements and hook-ups which are possible in this system and provide unusual functions or multiply the capacity of the system?	____________________ ____________________ ____________________ ____________________ ____________________

In general, are the functional requirements of the teaching task met by the operational characteristics of the system?

If no, please specify problems.

☐ Yes ☐ No

____
____
____
____

System Capacity

The following series of questions attempts to determine the capacity of the system measured in units of student use. (Disregard actual use and concentrate instead on optimum use of the system.)

What is the total number of student positions?

____

How many hours each week is the system available for scheduling students?

____________Gross hours

How many hours should be deducted for unpredicted system failures?

____________Unpredicted failures

How many hours should be deducted for scheduling problems? (passing classes, mealtimes, conflicts, etc.)

____________Scheduling problems

How many hours should be deducted for normal maintenance activities?

____________Maintenance activities

How many hours should be deducted for system loading (set-up time, previewing, etc.)?

____________System loading

What is the total of deductions?

__________ Total deductions

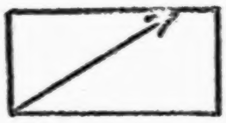
After making deductions what is the remaining available time?

Remaining time __________

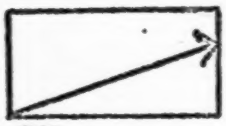
Multiply this last response by the number of student positions (See page 16) to obtain the gross number of student hours available under optimum conditions.

__________ Student hours (optimum)

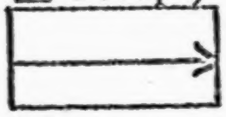
In your view, is the use of the system increasing, stabilized, or decreasing at this point in the life of the teaching system?



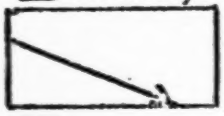
☐ Steeply



☐ Slowly



☐ Flat



☐ Decreasing

This series of questions has to do with reliability. It should help you detect problems which are limiting the effective use of your instructional system by interrupting or degrading the system performance.

RELIABILITY

Is system failure or image quality degradation ever a problem with this system?

☐ Yes --continue questions.

☐ No -- skip to next major subject heading.

Do failures of this system cause total or partial loss of the educational effect of the system?

☐ Can fail in part

☐ Can fail in total

☐ Quality deteriorates

Instrument for the Evaluation of Learning Devices

DUCTED BY THE AMERICAN INSTITUTES FOR RESEARCH

RESPONDENT IDENTIFICATION:

Name ____________________

Title ____________________

SYSTEM DIRECTOR

LEARNING DEVICE IDENTIFICATION:

Institution ____________________

☐ CAI	☐ ETV
☐ DAIRS	☐ LL
☐ MM CLASSRM	☐ MICROTEACHING

This questionnaire is part of a larger study conducted by the American Institutes for Research in which Faculty, Staff, and Students are being asked to help evaluate some of the Multi-Media Teaching Devices in use on this campus. Your responses will be merged with the responses of others; your ideas and reactions will be treated confidentially; and no personal identifications will be included in reports concerning the study.

SYSTEM DIRECTOR --- INDEX

History. 1

Identification of System. 2

Response Options 4

Student Control of Teaching System Advance . .5

Feedback Capabilities 6

Rationale for Selection 7

System Use/Use Rules 10

Cost (hardware) 11

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System Capacity 16

Reliability 17

Fidelity 18

Impact of Failures 23

Course Material Construction 25

Comparison of Software Costs 28

Critique 30

HISTORY

This section is designed to collect historical data on the development of phases through which the system progressed in coming to its present state.

Who was the originator of the idea for this teaching system?

Historical sketch: ____________________

____

____

____

Was there a problem or difficult situation that generated a need for which this "system" was offered as a solution?

If so, please state.

☐ **Yes** ☐ **No**

____

____

____

____

Was this system originated from a need to "keep up with the Joneses" emanating from administratiors or development office personnel?

☐ **Yes** ☐ **No**

Was this system considered innovative or original in its conception and early development?

If so, how?

☐ **Yes** ☐ **No**

____

____

____

____

Have the goals or objectives been specified at any time?

If yes, when? Please describe.

Are copies of goals or objectives available. Please affix, or list on facing page.

☐ Yes ☐ No

____

____

____

____

Did the original "seed money" come from:

☐ Researcher's personal pocket

☐ Institutional funds

☐ State or federally supported funds

☐ Other source (specify) ________

____

____

Can you trace the developmental stages through which the system has gone?

If yes, please specify on facing page.

☐ Yes ☐ No

IDENTIFICATION OF SYSTEM

What is the name of the system?

____

____

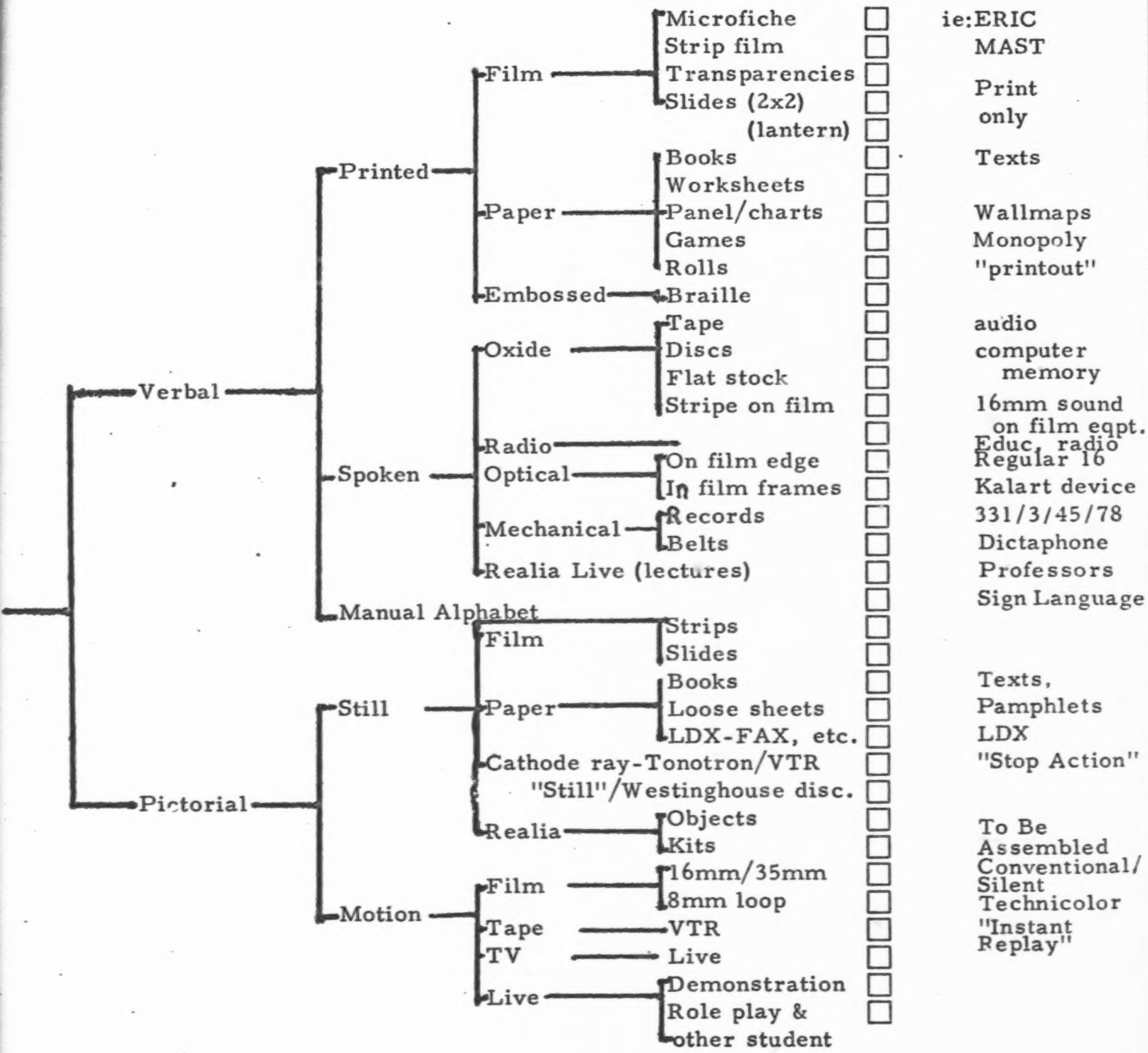
____

Do you consider this a discrete system or a sub-system interconnected with other electro-mechanical teaching complexes or systems?

☐ Discrete ☐ Interconnected

On the next page please check all the input means used in connection with this system

INPUT ARRAY


Verbal
Printed
Film
Microfiche ☐ ie:ERIC
Strip film ☐ MAST
Transparencies ☐ Print only
Slides (2x2) ☐
(lantern) ☐
Paper
Books ☐ Texts
Worksheets ☐
Panel/charts ☐ Wallmaps
Games ☐ Monopoly
Rolls ☐ "printout"
Embossed
Braille ☐
Spoken
Oxide
Tape ☐ audio
Discs ☐ computer memory
Flat stock ☐
Stripe on film ☐ 16mm sound on film eqpt.
Radio ☐ Educ. radio
Optical
On film edge ☐ Regular 16
In film frames ☐ Kalart device
Mechanical
Records ☐ 331/3/45/78
Belts ☐ Dictaphone
Realia Live (lectures) ☐ Professors
Manual Alphabet ☐ Sign Language
Pictorial
Still
Film
Strips ☐
Slides ☐
Paper
Books ☐ Texts,
Loose sheets ☐ Pamphlets
LDX-FAX, etc. ☐ LDX
Cathode ray-Tonotron/VTR ☐ "Stop Action"
"Still"/Westinghouse disc. ☐
Realia
Objects ☐ To Be
Kits ☐ Assembled
Motion
Film
16mm/35mm ☐ Conventional/ Silent
8mm loop ☐ Technicolor
Tape
VTR ☐ "Instant
TV
Live ☐ Replay"
Live
Demonstration ☐
Role play & other student ☐

Add categories if the system has other means for presenting information (or stimuli).

RESPONSE OPTIONS

The responses evoked by multi-media teaching systems y over a wide range. Some are in the form of ughts, insights and understandings which are never pressed externally. Others, like page-turning in a wderian branched program, are only the external servable evidence of far more complicated responses d chains of reasoning. The following questions tempt to clarify and define the response options ssible with the media system under study.

heck all of the response modes characteristically used by students in courses which use this media system.

umerical responses

☐ Handwritten computations
☐ Key-punched computations
☐ Marking selected answers
☐ Entering numerals as symbols

isual response patterns

☐ Drawing sketches
☐ Selecting displayed pictorial alternatives
☐ Light-pen constructions for electronic comparison to models
☐ Performance responses
  ☐ Constructions
  ☐ Completions
  ☐ Generalized role-play
  ☐ Apprentice emulation

an you define other response modes hich students use with this system? lease enumerate. ____________________

____

____

____

Verbal Response

☐ No overt action
☐ Push buttons (Edex)
☐ Page-turning (Crowder)
☐ Mark sensing (Tests)
☐ Symbol Entry (Entry of a symbol in a blank space to denote choice of alternatives.

Utterances

☐ Unrecorded
Recorded
  ☐ For immediate comparison by monitor
  ☐ For immediate comparison by student
  ☐ For later playback by monitor
  ☐ For later playback by student

Hand written

☐ Unsystematic notes, not saved
☐ Preserved for student use and evaluation
☐ Preserved for monitor comparison or correction (papers, etc.)
☐ Displayed on cathode ray tubes

Typed verbal responses

☐ Unpreserved
☐ Preserved for student comparison (notes)
☐ Preserved for monitor evaluation (papers, reports, etc.)
☐ Typed into computer for comparison with computer-held model.
  ☐ Held in computer memory
  ☐ Lost after comparison

Are there other response options not mentioned above or sub-classifications not given above which would prove more meaningful to educatiors attempting to plan educational presentations? If yes, please mention in the space provided.

☐ Yes ☐ No

Comment ____________________

____

____

____

STUDENT CONTROL OF TEACHING SYSTEM ADVANCE

Does this system permit student responses or other activities to control the development of the instructional presentation?

☐ Yes ☐ No

If yes, which of the following types of response can be accomodated?

☐ Constructed responses (utterances, typewritten entries, etc.)

☐ Selected responses (push-button, light-pen, etc.)

☐ Other (please describe) ________

____

____

FEEDBACK CAPABILITIES

Feedback of knowledge of the correctness of his response to the student is frequently an important part of a teaching system. The correctness of these feedback provisions and their promptness have a direct bearing on the efficiency of the teaching system. The following questions pursue this issue.

Does this teaching system make provision for any feedback concerning the correctness of student responses during the periods of use?	☐ Yes ☐ No
If yes, what is the approximate delay between emission of a response and the provision of feedback (give time in seconds or fractional parts of a second)?	____________ Seconds
Which of the following statements best describes the nature of the feedback which is provided?	☐ A correct model for self-comparison by the student ☐ A simple announcement of the incorrectness or correctness of the response (comparison with the model having been accomplished by the system equipment rather than the teacher or student). ☐ Corrective feedback (equipment reports on deficiencies in the student response and provides corrected response). ☐ Other (please specify) __________ ______________________________ ______________________________

Is this system an "all or nothing" system (that is, do system failures block out all or part of the system)? Or does failure cause a progressive attrition in signal quality or learning facility without shutting down the system completely?	☐ All ☐ Part
Total system failures:	☐ Possible ☐ Common ☐ Unlikely ☐ Never
Modules or units fail:	☐ Often ☐ Sometimes ☐ Never
Quality deteriorates:	☐ Often ☐ Occasionally ☐ Seldom ☐ Never

Are you satisfied with the present functioning of the hardware in the system?	☐ Yes ☐ No
If no, what do you think could be done to improve the situation?	Describe ____________________ ______________________________ ______________________________ ______________________________

RATIONALE FOR SELECTION

In general, when essentially similar imulus material could have been conveyed other means at lower cost, it is important recapitulate the arguments used to justify e selection in the first place.

Why was this system selected over other systems capable of conveying equivalent signals to the same sensory apparatus and decoding paths?	______________________________ ______________________________ ______________________________

(1) If system is CAI, why were concepts like PI, Text and test, and workbooks passed over?

(2) If system is DAIRS, why were language lab, phonograph, telelecture, live-speech and radio, etc. passed over?

(3) If system is Multi-Media classroom, why were carrel applications, audio-tutorial methods, conventional audio-visual programs and library resources passed over?

(4) If system is closed circuit television, why were open-circuit television film programs, tape/slide programs, phonograph-plus-filmstrip presentations and other mailable multi-sensory media passed over?

(5) If system is video-tape recorder, why were role play, games, classroom simulator, etc. passed over?

Still another question: Are any of the following reasons important in understanding the selection of this specific system over others of its class?

☐ Improved teaching of regular subjects.

☐ Standardized teaching of regular subjects.

☐ Pedagogical innovation made possible.

☐ Improved fidelity of image made possible.

☐ Equipment reliability improvement expected.

☐ Economy anticipated (explain how)

____

____

____

☐ Versatility of medium compared to other alternatives.

☐ Acceptability of this medium to teachers.

☐ Acceptability of this medium to students.

☐ Motivational aspects of student response to equipment.

☐ Other reasons (please explain)

____

____

____

____

____

SYSTEM USE

Estimate the actual gross number of hours of student use per annum for this system. (Compute average positions used x hours scheduled per week x weeks used per year.)

(________) x (________) x (________)
positions hours/wk wks/yr

= (______________)
gross hours use

Is the service "adjunctive support" or "whole-course-presentation".

☐ Adjunctive ☐ W.C.P.

USE RULES

Is this system available to the students on demand (first come, first served) or do they have to reserve or "sign-up" for each use of the system?

☐ Demand ☐ Reserve

☐ Other Arrangement (please specify)

____

____

Use actual or estimated figures in giving the following costs: In computing original hardware cost of the system, the following factors should be considered:

$ ______ consultants hired to write specifications.

______ visits made to installations for inspections.

______ costs of ordering, receiving shipping, storage, etc.

______ cost of the space in which the equipment stands

______ costs of remodeling or rehabilitating the space to meet the system needs.

______ cost of hardware, wiring, and other direct system components (including software if sold as part of the hardware package).

______ cost of installation of system.

______ cost of rework, modification, and extras in order to make the system work.

______ cost of training personnel.

______ other costs.

Are there other elements of original cost which are hard to determine? What are these cost categories? Any estimates available?

____

____

____

In this section, the maintenance and replacement costs are to be accumulated. Estimate the cost per annum of the following:

$______ Cost of specialists or technicians to diagnose or make repairs

______ Cost of outside repairmen coming in to assist technicians

______ Cost of technicians wages and equipment

______ Cost of replacement parts and modules

______ Cost of heat, light, and janitorial services

______ Cost indicating a share of the university administrative budget

Are there other continuing costs which should be considered as part of the maintenance budget?

☐ Yes ☐ No
Amount ______

At the time of purchase what expected life was anticipated for equipment?

overall years of use

or: estimated # of student hours of use

______ years

______ student hours

After in-use experience, what is the present estimated actual life of equipment?

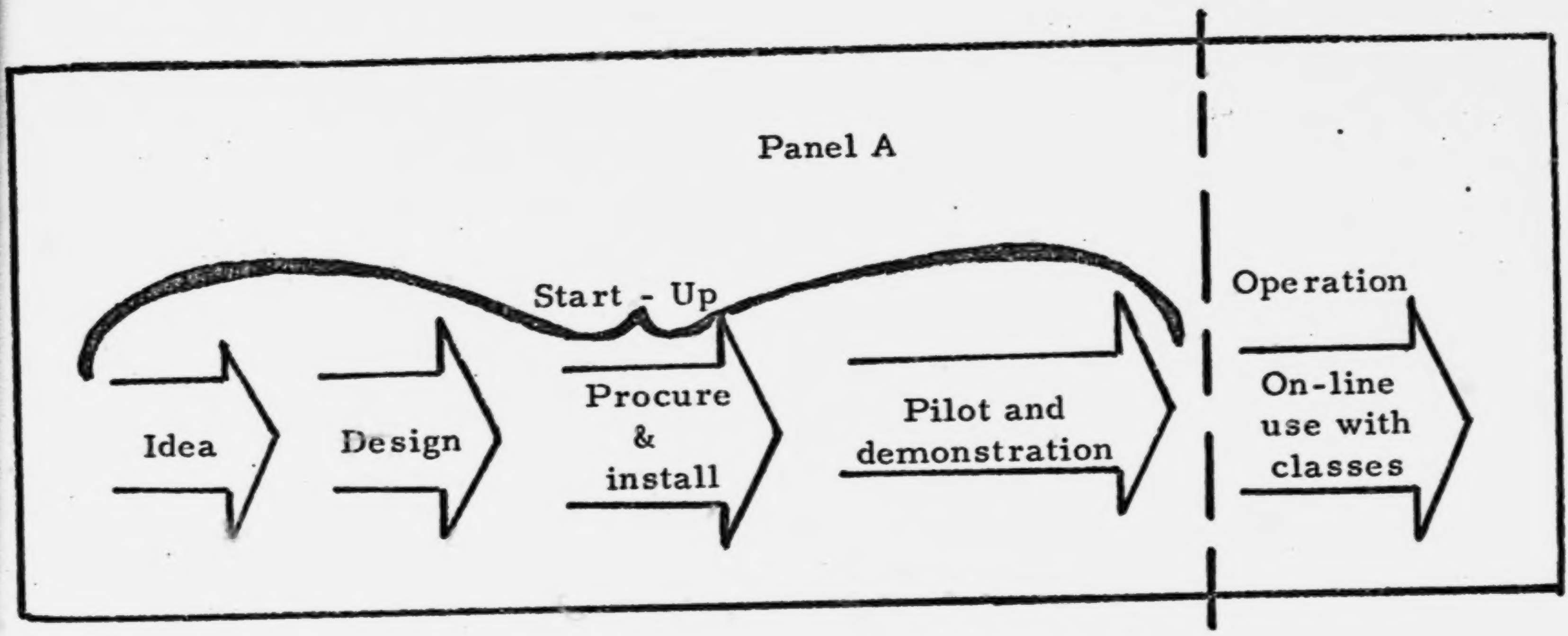
overall years of use

or: student hours of use

______ years

______ student hours

Anticipated and actual life of equipment are frequently measured in different terms. Actual life is given in student use hours, whereas anticipated given in calendar years. Check to see that both of the foregoing figures are given in the same units.


Panel A
Start - Up
Operation
Idea
Design
Procure & install
Pilot and demonstration
On-line use with classes

What is your estimate (in dollars) of the cost per hour per student of this system?

$________ per student hour

Amortize original cost (page 11) over estimated life; (bottom, page 12); add annual cost (top, page 12); divide by estimated hours of student use (page 10).

Please mention any factors (used to compute the "cost per student hour of use") which have not already been discussed.

____

____

____

____

START-UP PHASE

The previous diagram labeled, "panel A", indicates that a number of preliminary activities can be grouped together and referred to as the "start-up" period. Loosely speaking, these are all the events which occur before faculty are permitted to schedule regular, continuing on-line academic use of the system.

What kinds of problems were encountered during the "start-up" phase?

☐ tune-up and shake-down
☐ manufacturer doesn't follow through
☐ component not compatible or appropriate
☐ failure of delivery schedules
☐ other (specify) ________________

____

During the design phase were functional specifications written? (In pedagogical terms)

If so, please provide; if not, please re-construct in the space provided.

☐ Yes ☐ No

____

____

____

____

Were technical specifications written (describing the mechanical and electronic operations and equipment which would be necessary to achieve the functions described in the functional specifications)?

If so, please provide; if not, please re-construct in the space provided.

☐ Yes ☐ No

Have functional and/or technical specifications been written, developed in memorandum form, or adopted for the software to be used with this system?

☐ Functional Software Specifications
☐ Technical Software Specifications
☐ Guidelines only
☐ Publications Guide

Please supply a system diagram or sketch showing how the components of the system are related or used (in the functional relationship sense).

Use facing page.

Are there special arrangements and hook-ups which are possible in this system and provide unusual functions or multiply the capacity of the system?

In general, are the functional requirements of the teaching task met by the operational characteristics of the system? If no, please specify problems.	☐ Yes ☐ No ____________________ ____________________ ____________________ ____________________

System Capacity

The following series of questions attempts to determine the capacity of the system measured in units of student use. (Disregard actual use and concentrate instead on optimum use of the system.)

What is the total number of student positions?	____________________
How many hours each week is the system available for scheduling students?	__________Gross hours
How many hours should be deducted for unpredicted system failures?	__________Unpredicted failures
How many hours should be deducted for scheduling problems? (passing classes, mealtimes, conflicts, etc.)	__________Scheduling problems
How many hours should be deducted for normal maintenance activities?	__________Maintenance activities
How many hours should be deducted for system loading (set-up time, previewing, etc.)?	__________System loading

What is the total of deductions?

____________Total deductions

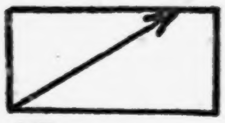
After making deductions what is the remaining available time?

Remaining time ________

Multiply this last response by the number of student positions (See page 16) to obtain the gross number of student hours available under optimum conditions.

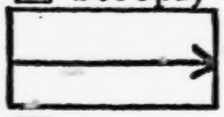
____________Student hours (optimum)

In your view, is the use of the system increasing, stabilized, or decreasing at this point in the life of the teaching system?

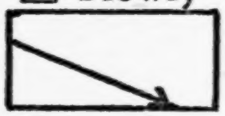


☐ Steeply

☐ Slowly



☐ Flat



☐ Decreasing

This series of questions has to do with reliability. It should help you detect problems which are limiting the effective use of your instructional system by interrupting or degrading the system performance.

RELIABILITY

Is system failure or image quality degradation ever a problem with this system?

☐ Yes --continue questions.

☐ No -- skip to next major subject heading.

Do failures of this system cause total or partial loss of the educational effect of the system?

☐ Can fail in part

☐ Can fail in total

☐ Quality deteriorates

FORECAST

Effectiveness of a system can sometimes be inferred from people's intention to expand its use or size.

Looking forward one year:

Will the intensity of use be:

smaller	same	half	doubled	more than doubled	____ times larger

Will the size of the system be:

smaller	same	half again larger	doubled	more than doubled	____ times large

Looking forward five years:

By how large a factor will your needs be increased: (over the present system)

0	1/2	1	2	5	10	____ times larger

What is your expected percentage of increase in enrollment over 5 years?

____________%
percent

Please estimate the financial outlay for expansion of this type of system:

During next one year budget?

$ ____________
(round figures)

During next five-year period?

$ ____________
(estimate please)

Systems vary in the degree of fidelity or image quality they can deliver. These questions explore the educational needs imposed on the system and the equipment capabilities available to meet those needs.

Fidelity Requirements

What are the general needs which this equipment is expected to serve?

- ☐ "Let us reason together" (abstract, symbolic verbal interaction).
- ☐ "Let me show you" (demonstrative, audible and visible iconic messages).
- ☐ "You try it" (complex behaviors, actual performances, etc).

Is this system under-used? That is, can this system do more than it is regularly called upon to do? (i. e.: using a video channel for an essentially audio transmission or using a multi-media classroom as a lecture hall).

☐ Yes ☐ No

Comment ____________________

____

____

Consider each of the appropriate variables for a visual system.

Is color or black and white required?

☐ Color ☐ B & W

Is motion or are still pictures required?

☐ Motion ☐ Still

Is this system stereoptical or monocular?

☐ Stereoptical ☐ Monocular

What is the maximum visual angle? (screen width as it relates to focal distance)

____________________ Visual angle

What are the limits of focal distance?	
What is the TV resolution?	
What is the optical image resolving power?	
What brightness measure of visual image is used?	
What degree of brightness can be achieved?	
What degree of brightness is acceptable?	
What degree of color fidelity is obtained?	
What is the frame rate (in frames per second) for motion?	
What is the change speed (in seconds) for still picture change?	

Consider each of the appropriate variables for an audio system.

Is this system stereophonic or monaural?

☐ Stereophonic ☐ Monaural

What are the frequency response characteristics of the audio portion?

Do you have a frequency response chart showing acceptable characteristics? (If yes, please include a copy)

☐ Yes ☐ No

If unusual frequency characteristic is desirable, please indicate how it is useful.

What "signal-to-noise" ratio is acceptable?

What "signal-to-noise" ratio is achieved?

Consider each of the appropriate variables for printed materials or print-out devices.

Type face

Focal distance

Interlinear spacing

Visual angle subtended (line length as it relates to focal distance)

Speed
(for print-out and visual display devices, in words or symbols per unit of time)

How do you measure lighting at reading surface? What is an acceptable level? What is achieved in this system?

____

____

____

What is an acceptable level? ______

____

____

What is achieved in this system?

Line length__________________

____

____

____

What is the ambient light level at working surface?

____

____

____

____

____

IMPACT OF FAILURES

In order to estimate the effect of unreliable operation it is often necessary to compare the optimum performance with actual performance. The following series of questions will help you determine the proportional effect of interruptions caused by unreliable equipment.

System failures are:	☐ Negligible (skip to next page) ☐ Significant
What is the total number of students using (or intending to use) the system each week? Make no adjustments for cuts, down-time, cancellations, etc. (see page 10)	__________# of students each week
What is the average number of hours each student is expected to use the system each week? Make no adjustments for equipment failures, cuts, etc.	__________# average use in hours
Multiply the foregoing figures to estimate the gross number of student hours a week.	__________ estimated student hours of use each week
Estimate the number of students effected by outright system failure.	__________# of students effected by failures in average week
Estimate the number of students effected by deterioration of the image below learning thresholds.	__________# of students whose learning is effected by degraded image quality

Estimate the average number of hours (or minutes) of lost time experienced by the students.

__________# average loss due to failures.

__________# average loss due to deteriorated image quality

Compute the number of student hours lost each week for each class of defect in system.

__________ # students x __________ lost time = __________ failures

__________ # students x __________ lost time = __________ deterioration

total (add) = __________

Compute the percentage of instructional time lost due to reliability problems.

__________%

Please check, in the following list of factors, those which have been considered in the foregoing questions when computing down-time percentages.

☐ Receptor failures (headphones, terminals, monitors, etc.)

☐ Generator failures (projectors, cameras, tape decks, etc.)

☐ Time losses due to poor training of employees (mixups, poor preparation)

☐ Failures due to defective information storage components (film, tape, etc.)

☐ Budgetary and maintenance.

☐ Other major cause (specify) __________

____

____

COURSE MATERIAL CONSTRUCTION

Is special consideration given in the form of decreased teaching load for staff members who prepare special materials for courses?

☐ Yes ☐ No

Are there any other considerations given? If so, please specify.

☐ Yes ☐ No

____

____

Select an example of teaching material (VTR presentation, programmed instruction unit, language tapes) developed on this campus for use on this device. Identify and describe it.

Name __________________________

____

Description ____________________

____

Content ________________________

____

Format ________________________

____

Technician Specialties ________

____

What provision is made for the determination of copy right ownership at this institution

☐ Professor owns all rights
☐ Professor owns only those things done outside the office
☐ University owns all rights
☐ Non-professors (technical personnel, grad. students etc.) have norights to materials they prepare

Do copyright and ownership rules impede or enhance The flow of original soft ware from Teachers?

☐ impede
☐ enhance
☐ other effect: (specify)

Keeping the above-described example in mind, please check those elements of the following check-list which were accomplished during the construction of the teaching material.

1. Establish or define course segment objective ________ ☐
2. Specify terminal behavior ________ ☐
3. Determine criterion performance ________ ☐
4. Test construction: "entry" test items ________ ☐
5. Test construction: terminal "final" test items ________ ☐
6. Plan field or chain of instructional activities ________ ☐
7. Select content (concepts, ideas, skills) for each event ________ ☐
8. Choose medium or media of instruction for each event ________ ☐
9. Write verbal portions of presentation ________ ☐
10. Prepare "story-board" of pictorial portion ________ ☐
11. Record verbal portions (tapes, etc.) ________ ☐
12. Prepare or reproduce visuals (photos, charts) ________ ☐
13. Correlate audio and visual elements ________ ☐
14. Test construction: ("quiz" on this unit) ________ ☐
15. Define appropriate response of learners ________ ☐
16. Administer tests at entry level ________ ☐
17. Conduct or monitor teaching/learning situation ________ ☐
18. Administer tests at progress point (quiz) ________ ☐
19. Score Item Analyze tests ________ ☐
20. Write individual "prescriptions" for slow or fast learners ________ ☐
21. Administer test at terminal point ________ ☐
22. Revise materials in terms of experience ________ ☐
23. Other tasks ________ ☐

Comments: ________

____

____

Do you have guidelines, procedures book, or other material describing your materials development sequence?

☐ No
☐ Yes,
Please attach.

SOFTWARE COSTS

It is sometimes useful for faculty to analyze the tive cost of preparing unique materials, using entional teaching techniques, and using prepared, hased materials. The following questions may help at this question.

Take into consideration the cost of: published materials, texts, library resources which are allocated for this course (assigned and research), and other information resources which are purchased from outside sources. Attempt to assign a cost per student hour for purchased material/ Consider life expectancy of text materials, life expectance of library acquisitions and other factors which cause cost per student hour to rise.

Computation

$$\frac{\text{Gross cost of all published materials used in course}}{\text{Gross number of hours student time spent with published materials}} = \text{Cost per hour of educational activity derived from published materials}$$

$$\frac{\text{Cost \_\_\_\_\_\_}}{\text{student time spent \_\_\_\_\_\_}} = \text{Cost per hour \_\_\_\_\_\_}$$

lease perform a similar computation
r prepared materials. Here again
fort should be devoted to estimating
fe expectancy of on-campus prepared
aterials. Are lecture notes, tapes, lab
uide worksheets, and other locally pre-
ared materials used for more than one
emester? How does this effect the cost
er hour of instruction estimated?

omputation

$$\frac{\text{Gross dollar cost of staff time spent preparing for and delivering lectures and locally preparing teaching materials}}{\text{Gross number of student hours using locally prepared materials and attending lectures}} = \text{Cost per hour of educational activity derived from on-campus prepared materials}$$

$$\boxed{\frac{\underline{\qquad}\ \text{cost of staff time}}{\text{number of student}\ \underline{\qquad}\ \text{hours}} = \text{Cost per hour}\ \underline{\qquad}}$$

CRITIQUE

We would like to have some information from you concerning the method and content of our study.

Are there questions you expected us to ask which we have overlooked? Please discuss. ______________________________

What do you like about this project? ______________________________

What do you not like about this project? ______________________________

ld Instrument for the Evaluation of Learning Devices

NDUCTED BY THE AMERICAN INSTITUTES FOR RESEARCH

RESPONDENT IDENTIFICATION:	Name ____________________ Title ____________________

INSTITUTIONAL RESEARCHER

LEARNING DEVICE IDENTIFICATION:	Institution ____________________ ☐ CAI ☐ ETV ☐ DAIRS ☐ LL ☐ MM CLASSRM ☐ MICROTEACHING

This questionnaire is part of a larger study conducted by the American Institutes for Research in which Faculty, Staff, and Students are being asked to help evaluate some of the Multi-Media Teaching Devices in use on this campus. Your responses will be merged with the responses of others; your ideas and reactions will be treated confidentially; and no personal identifications will be included in reports concerning the study.

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INSTITUTIONAL CHARACTER

Field Instrument for the Evaluation of Learning Devices ELD) contains several segments. This material deals h the identity and character of the institution in which ti-media systems are being studied.

s segment, conventional identifying information (such the type and size of the student body of the institution) l be collected. In addition, some more subjective qualities l be discussed which have bearing on the objectives and ls which the multi-media system is called upon to support.

e composition of the student body frequently yields impor-nt information concerning the nature of the service the llege is providing to its students.

STUDENT BODY COMPOSITION

lease select one statement which comes closest to dentifying the student group served at this institution.

☐ The majority are between 17 and 22 years of age.

☐ There is a substantial portion of working persons and "retreads" in an otherwise straight undergraduate student body.

☐ A very significant portion are mature, independent, working adults with a scattering of ages up into the 30's.

☐ Other thumbnail sketches:_____

____

____

____

Speaking generally, what family income group tends to patronize this institution?

☐ Even mixture of wealthy, middle-class, and working class students.

☐ Predominantly wealthy and upper-middle class students

☐ Mostly middle-class youths whose parents are making a major contribution to their college costs.

☐ Predominantly working class with many students paying all or part of their own fees.

☐ Other characteristization of the family income group. Specify_______________

____

____

COMMUTER/RESIDENT RATIO

proportion of commuters vs. residents
quently helps establish the academic climate
college.

ease indicate the relative percentages of commuters
d on- or near-campus residents.

% of commuters

% of residents

selection process often exerts profound influences
the character of an institution and on the educational
grams and systems used in it.

SELECTION PROCESS

hat is the approximate College Entrance Exami-
ation Board, ACT, or other test cut-off
core below which only a few unusual students
heletes are accepted?

____________CEEB score
____________ACT score
____________%ile for other tests

re there regional, religious, social or cultural
ctors which have a bearing on aspirations and
oals of the young people, or which help to set
e tone of the institution as a whole? Please
escribe in the spaces provided.

Regional________________________________

____

____

Religious________________________________

____

____

Social__________________________________

____

____

hat is the approximate geographic distri-
ution of student origins?

Regional ________________%
Within state________________%
Out of state________________%
Foreign________________%

o the selection processes used here exert
ny control or shaping forces on the:

Content of your media system?____________

____

____

or the Equipment mix of your MM system?

____

____

NORMATIVE DATA

is series of questions should be answered in terms of
e campus where the MM system is being studied.

hat is the total student population on this campus?

__________________(number)

f the total how many are part-time and how
any are full-time students?

__________________full-time

__________________part-time

f the total what is the sex composition ?

____________males

____________females

Can your institution be readily characterized?

CHARACTERIZATION

oes this college fall within one of the following
ategories: (Mark two if needed)

- ☐ Old land-grant university
- ☐ Denominational college
- ☐ Endowed private insitution
- ☐ City-operated commuter college
- ☐ two-year community college
- ☐ Younger burgeoning state university
- ☐ Other (specify)______________

____

____

What is the total population of the commuter
ool area (or Metropolitan Area or Marketing
rea) in which this college is located?

____
total population

s this college located in the:

- ☐ Eastern metropolitan corridor
- ☐ Middle West
- ☐ Southwest
- ☐ Far West
- ☐ South

s this a single campus institution or is the
ulti-media installation we are studying located
n one of several campuses?

- ☐ Single campus institution
- ☐ Multi-campus institution

t all schools have the same mix of "years", lleges, sequences etc.

GRADE LEVELS SERVED

hat is the estimated size of the following roups?

______________ freshmen
______________ sophomores
______________ juniors
______________ seniors
______________ graduates
______________ other (designate)
____

hich of the statements below best describes or efines the organizational structure of your nstitution?

☐ Institution divided into schools
☐ Institution divided into colleges
☐ Institution divided into divisions
☐ Other (designate) ______________
____

Give the names of the major subdivisions of this institution.

____
____
____
____

Do you emphasize the four-year liberal arts program, the undergraduate specialization sequences, and the graduate level programs equally?

If no, where is emphasis?

☐ Yes ☐ No

☐ Liberal Arts
☐ Specialization (engineering, business, etc.)
☐ Graduate programs

FUNDING/CONTROL

Is this college or university:

☐ State supported
or
☐ Privately endowed
or
☐ Combination (explain)
____
____

oes a board of directors or trustees help rmulate school policy?

☐ Yes ☐ No

How are they selected?

☐ Election
☐ Appointment
☐ Self-perpetuating
☐ Other____________________

The size and composition of the faculty often is esumed to have bearing on the character and success a school.

FACULTY COMPOSITION

ow many faculty members do you have?

_______________(number)

oncerning this total number of faculty members lease give rough, off the cuff, estimates of the ollowing breakdowns:

Intensity of service

__________% part-time
__________% full-time

Sex composition

__________% male
__________% female

Degrees held

__________% Ph.D. or equiv.
__________% M.A. " "
__________% B.A. " "

Titles held

__________% full professor
__________% assoc. professo
__________% asst. professor
__________% instructor

Salaries earned (put part-timers in the category they would be in if they were to work full-time)

__________% under $5,000.
__________% $5000/7,500.
__________% $7500/10,000
__________% $10,000/12,500
__________% $12,500/15,000
__________% $15,000 & abov

FACULTY TIME USE

It is frequently useful to estimate the relationsh'p
een teaching load and research time allotments. The
tions are addressed to

this institution faculty members use their
e approximately as follows:

_____________% teaching

_____________% research & writing

_____________% off-campus consult & comference

_____________% administrative

_____________% other _____________

____

the teaching time what proportions are
voted to the major separate elements of
teaching program (use fractions)?

_____________ preparation

_____________ group instruction

_____________ tutorial & counseling

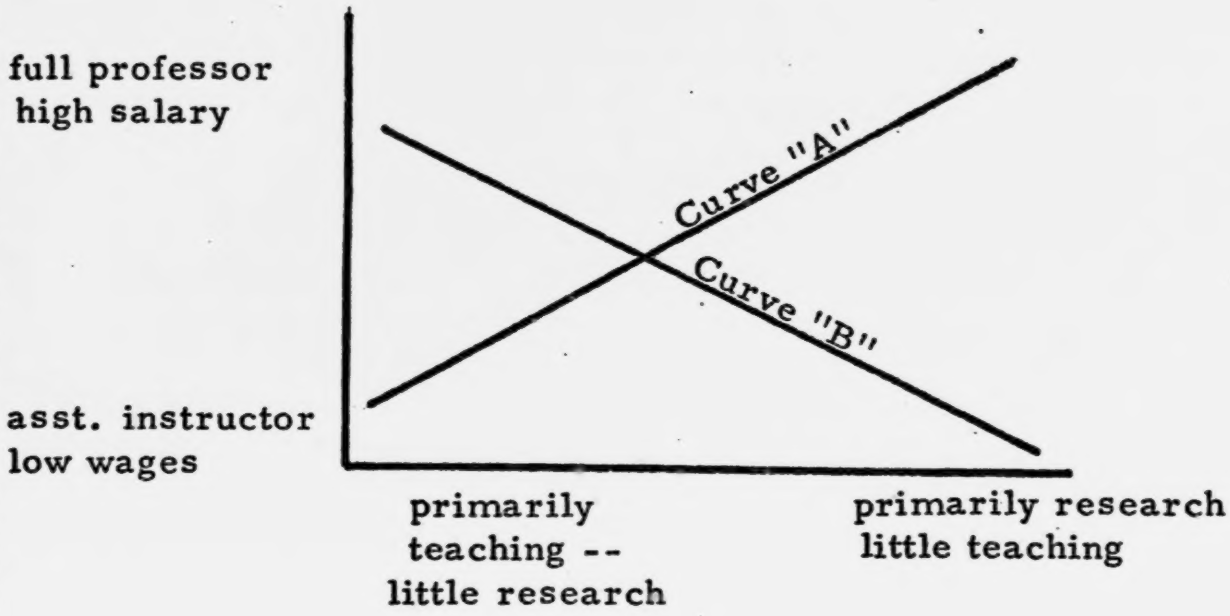
_____________ evaluative activities

_____________ other (specify)_________

____

SALARY/RESEARCH/TEACHING CURVE

low is a blank graph on which to
licate the relationship which exists,
your campus, between title and
lary on the one hand and amount of
search and teaching on the other.



☐ A

☐ B

e foregoing is too simple to describe the t" of your institution, please indicate if i-modal" curve exists or what other ation exists. Comment.______________

APPENDIX B

Software Cost Estimation Procedure Data Form

The purpose of this questionnaire is to arrive at an estimate of the cost of the software being used with the media system under study. Making such an estimate is quite difficult. This is due to the number of factors involved in estimating the cost of software and the difficulty of placing a price tag on each of the factors involved in the estimate. The following set of questions is designed to gather information about the factors involved in the cost of software, then to meaningfully combine these factors to arrive at the final cost estimates of software:

SOFTWARE TYPE

1. Which of the following types of software materials are used with this system?

Prepared on the campus ☐ _____%

Commercially prepared (purchased) ☐ _____%

If both campus prepared and commercially prepared software materials are used, please indicate an estimate of the percentage of the total software which is campus prepared and the percentage which is commercially prepared on the line next to the choices provided. If you are using commercially prepared software only, skip to Question 13. If you are using campus prepared materials go to Question 2, beginning immediately below.

ON-CAMPUS PREPARED MATERIALS

In this series of questions you are asked to answer questions about and calculate the cost of the on-campus prepared materials in your software library.

For each of the materials media in your library prepared on-campus, you will be asked to calculate cost as follows:

Calculate the gross cost of each of the materials in your software library, include professional time required to prepare and test the materials, technician time, cost of materials (tape, film, etc.) and cost of hardware time required to test and revise software and miscellaneous cost.

2. This question deals with the medium on which materials are stored in your library of software. Please look at the diagram below and check off in the boxes to the right those storage media which are being used for the software materials contained in your library.

SOFTWARE MATERIALS MEDIA

Medium	Number On Hand	Average Cost Per Unit
Microfiche Cards		
Film Strips		
Transparencies		
Slides (2x2, 10x10, other) (lantern)		
Books		
Worksheets		
Panels/Charts/Maps		
Games		
Tape (1/4" Audio, Video)		
Oxide Discs		
Magnetic Stripe Films		
Optical Sound Films Edge		
Records		
Belts and other Audio Sources		
Lectures, Live		
Objects		
Kits		
8 mm Loop		
VTR		
Others		
____________________		
____________________		
____________________		
____________________		
____________________		

3. Indicate the size of the library of software materials used with this system, or each of the media specified in Question #1. For each specify a measure of the physical length of the software materials. For example, indicate for slides the number of slides; for film, the length of film; for books, the number of pages, etc. Also, indicate the length of instructional time for which these software materials are used during one academic year.

4. This question attempts to determine the size of your software library in terms of the number of copies in each medium. For each of the media checked above, please indicate the gross number of copies in your software library. Then indicate the net number of copies which have been in use during the last year.

5. In this question you are asked to estimate the average frequency of use of each of the media in your software library. Indicate the average frequency of use of each of the media in terms of number of times used per academic year.

6. Please indicate here the gross number of student hours per academic year of use for each medium.

7. In this question you are asked to begin to provide the factors which make up on-campus prepared software costs. Please indicate for each medium the professional cost of software materials preparation (Hours X Salary/hours).

8. Please indicate the cost of technicians' time in preparing these software materials. (Hours X Salary/hour)

9. Please indicate the cost of materials for this software.

10. Please indicate the cost of hardware time to test and revise software.

11. Please indicate any miscellaneous cost.

12. Next estimate the life expectancy of each of the software materials in your library.

Based on these cost figures an estimate of the cost of software materials in your library on a yearly basis can be made. Then the cost per student hour of use per academic year can be calculated for each media, dividing the total cost per academic year by the gross number of student hours of use per year.

If you are also using commercially prepared materials, please go on to the next section.

COMMERCIALLY PREPARED MATERIALS

In this series of questions you are asked to provide information about and calculate the cost of each of the commercially prepared materials in your software library.

13. This question deals with the medium on which materials are stored in your library of software. Please look at the diagram below and check off in the boxes to the right those storage media which are being used for the software materials contained in your library.

SOFTWARE MATERIALS MEDIA

Medium	Number On Hand	Average Cost Per Unit
Microfiche Cards		
Film Strips		
Transparencies		
Slides (2x2, 10x10, other) (lantern)		
Books		
Worksheets		
Panels/Charts/Maps		
Games		
Tape (1/4" Audio, Video)		
Oxide Discs		
Magnetic Stripe Films		
Optical Sound Films Edge		
Records		
Belts and other Audio Sources		
Lectures, Live		
Objects		
Kits		
8 mm Loop		
VTR		
Others		
____________________		
____________________		
____________________		
____________________		
____________________		

14. Indicate the size of the library of software materials used with this system, for each of the media specified in Question #1. For each specify a measure of the physical length of the software materials. For example, indicate for slides the number of slides; for film, the length of film; for books, the number of pages, etc. Also, indicate the length of instructional time for which these software materials are used during one academic year.

15. This question attempts to determine the size of your software library in terms of the number of copies in each medium. For each of the media checked above, please indicate the gross number of copies in your software library. Then indicate the net number of copies which have been in use during the last year.

16. In this question you are asked to estimate the average frequency of use of each of the media in your software library. Indicate the average frequency of use of each of the media in terms of number of times used per academic year.

17. Please indicate here the gross number of student hours per academic year of use for each medium.

18. Calculate the gross cost of the software materials including the initial purchase cost, and shipping or handling cost for each media.

19. Next estimate the life expectancy of each of the software materials in your library.

Based on these cost figures, an estimate of the cost of software material in your library on a yearly basis can be made. The cost per student hour of use per academic year, can be calculated by dividing the total cost per academic year by the gross number of student hours of use per year.